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T. A. RICKARD.....EDITOR
FREDERICK HOBART, CHARLES S. PALMER.....ASSOCIATE EDITORS

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EDITORIAL.

NOTHING IN THIS world is altogether satisfactory. The Chinaman on the Witwatersrand is developing into a satisfactory miner, but he is not free from the traits and tricks which distinguish him in California and elsewhere. He has not the simple nature of the Kaffir, and needs watching at his work, as mine foremen are finding out gradually.

THE ORE-CARRYING capacity on the Great Lakes is to be increased this season by a number of large vessels, which will be, probably, the most economical carriers ever built. They will be part of the fleet controlled by the United States Steel Corporation, and will replace some of the older and smaller boats. A vessel which will carry 10,000 tons of iron ore on a 23-ft. draft, which can be loaded in two hours and unloaded in about twice that time, is no mean achievement from a mechanical point of view. That is what the new ships are designed for, and there is very little doubt that they will do it.

IN A RECENT issue, notice was given of a test of the fire assay of tellurides, by two experts of high authority. In this connection it should, perhaps, be mentioned that good western practice does not trifle with tellurides; the whole point is that from fifty to seventy parts of lead are added to one part of ore, so easily does tellurium destroy the tension of the lead button in the cupel.

THE STRIKE OF the German coal miners is in gradual process of settlement, in something the same way as our own anthracite strike was finally settled. The miners generally accepted the promise of the Government to adopt certain legislation on the report of its commission. The new laws, which will, of course, be binding on the operators, include a shorter working day, and substantial concessions on other points asked for by the miners. On the Government assurance that these reforms will be carried out, the miners voted to return to work, and a large number of them have done so. Some delays and some friction have been caused by the refusal of the operators at certain mines to take back the entire force. It appears probable, however, that these difficulties will be settled, especially as the Govern-

ment is insisting very strongly upon its point. Up to date about two-thirds of the miners have returned to work, and the prospect is that the remainder will follow their example before long.

A BILL HAS BEEN introduced in the California legislature carrying an appropriation of $250,000 to establish and maintain a petroleum refinery to be operated by the State. The bill provides for a manager at $5,000 per annum, and an advisory board to consist of the Governor, Surveyor-general and manager. A similar bill pending in Kansas differs from the California proposition in that the former State is to run its proposed refinery with convict labor. No doubt increased refining capacity would be welcome to the oil producers, both in California and Kansas, especially if not controlled by a single interest. It does not appear, however, that there is any good reason why either State should go into the oil business. The miners of California have an equal right to ask the State to establish mills to treat their ore, and a right to consider a State refinery a discrimination against their interests.

THE LATEST bore-hole on the Witwatersrand—that at Doornkloof—is also the deepest. Operations were recently stopped at a depth of 5,550 feet, which is several hundred feet more than the Randfontein bore. It is stated, moreover, that there was very little deflection in this work, while there was considerable deviation from the vertical in previous operations. The work was done by a Sullivan drill, and the information obtained as to the strata in the Doornkloof area is said to be conclusive; though the results have not been made public.

A DECISION OF interest to mine-owners in settled districts has just been rendered in California. It is that a deed to agricultural lands does not in itself necessarily include the right to use the property for mining purposes. The point was raised in a suit in Amador county. The Central Eureka Mining Company, near Sutter Creek, deeded some of its land to James and Eliza Toman for agricultural purposes. These people at once laid claim to all the mineral rights on the land, and the East Central Eureka Mining Company was formed to work such part of the old original ledge as lies between the Toman's lateral boundaries. An injunction suit was brought by the Central Eureka Company, and the Supreme Court now decides that the original company has the right to work its veins wherever they may run, confining the grantees to the use of the land for agricultural purposes only.

A decision similar in its tenor was given by the Pennsylvania Supreme Court about three years ago, in a suit involving the right to work anthracite coal underground, when the surface ownership had passed to other parties, without an express grant of the mineral rights.

IT IS REPORTED that arrangements are nearly completed for an important consolidation in the western coal trade. It is understood that the Consolidated Coal Company, the largest operating company in Illinois, is to take over the Central Coal & Coke Company, which controls a large part of the Kansas coalfield. The combination would form the largest coal corporation west of Pennsylvania. As both the companies have close relations with the Gould railroads, the report is a probable one, and is generally accepted as true.

INYO COUNTY in California, which covers a large area adjoining the Nevada line, is profiting by the overflow of prospectors from the Tonopah, Goldfield and Bullfrog districts in Nevada. From the Inyo range to the State line the country is full of prospectors, and many more are expected when spring opens. In the southern part of the county there is already much activity. In the Gold Belt camp in the Cottonwood region, 35 miles east of Keeler, surface work gives promising indications. At Old Coso a new company is developing some copper deposits, and putting in machinery. Darwin is again quite lively, there being more men there than for a long time. At Lone Pine there is a marked revival of interest, a number of properties are being examined and the large dikes in that section are being prospected.

THE THREE great coal mining countries of the world produced last year, according to the preliminary figures, a total of 724,678,050 metric tons of coal. Of this great quantity the United States furnished 311,643,780 metric tons, Great Britain 243,840,000 and Germany 169,194,320 tons. The increase over 1903 was only a moderate one. The United States and Germany consume nearly the same quantity that they mine, their exports exceeding their imports by small amounts only; but Great Britain sends abroad nearly one-third of the coal produced, so that the home consumption is about equal to that of Germany.

THE FALL MEETING of the Iron & Steel Institute of Great Britain is to be held in Sheffield. This action remedies a curious accident or oversight, for since the Institute has been organized, it has never held a meeting in a city which is the center of the British steel industry, and in which, indeed, that industry was founded. The people of Sheffield, under the energetic leadership of Mr. R. A. Hadfield, propose to make this meeting a highly interesting one.

The Cost of Mining.

On another page we publish a suggestive contribution by Mr. W. R. Ingalls on the cost of mining, a subject of the utmost importance. Whether regarded in its broad economic aspect as implying the whole process of winning the metals, or in the narrower sense as covering only the actual breaking of ore, the question is one which must appeal to the readers of this JOURNAL in a most practical way. Just as in ordinary life it is a proverb that money is easier to make than to keep, so in mining it is not too much to say that the finding of ore requires less skill than the beneficiation of it; at all events, the haphazard methods of the one must ever be in strong contrast to the logical ways of the other. The subject presents many aspects, each of which invite discussion. There is the general question of the attainable minimum of expense as affecting the world's output of metals, and the relation of the growing rate of labor to the increasing application of machinery; there is the accountant's and director's view of the portion of cost properly chargeable to mining, with a glance back at the days when development was charged to capital account, and perishable machinery to assets. There is the general inquiry into the conditions which cause costs to vary within such wide limits in different mining regions, and the pertinent subject of the factors contributing to particularly creditable results at individual mines. Finally, there comes the broad problem

of practice underground, where more money is saved or lost than is dreamt of in the philosophy of the average investor. These are but suggestions; our own views will find expression at a later date, when our friends have given a good start to a discussion, the obvious usefulness of which should elicit a widespread expression of experience and opinion.

German Iron Production.

The iron industry of Germany was almost stationary last year, so far as the production of pig iron was concerned. In 1903 there was a gain over the previous year of 1,683,974 tons, or 20 per cent; last year, the increase over 1903 was only 18,307 tons, or 0.2 per cent. There were, however, considerable changes in the proportions of the different kinds of iron, as shown in the following table:

	1903.		1904.	
	Tons.	Per ct.	Tons.	Per ct.
Foundry iron..	1,798,773	17.8	1,865,599	18.5
Forge iron	859,253	8.5	819,239	8.1
Steel pig.	703,130	7.0	636,350	6.3
Bessemer pig. .	446,701	4.4	392,706	3.9
Thomas (basic) pig	6,277,777	62.3	6,390,047	63.2
Total	10,085,634	100.0	10,103,941	100.0

Steel pig, in the German classification, includes spiegeleisen, ferro-manganese, ferro-silicon and all similar alloys. It will be seen that forge iron and bessemer pig showed considerable decreases, the gains in foundry and basic irons keeping up the total. The German practice runs each year more to the use of the basic converter in putting the iron into final form. No other iron-making nation converts so large a proportion of its pig into steel, or makes so little use of the puddling furnace. The United States comes nearest to Germany in this respect, but uses, in proportion, more cast iron.

The Rhenish-Westphalian district is the largest producer, making last year 39.8 per cent of the total; while Lorraine and Luxemburg came next, with 32.3 per cent, Silesia supplied 8.2 and the Saarbezirk 7.5 per cent. The Rhenish-Westphalian furnaces are the largest makers of both foundry and Thomas pig, while Silesia is the chief source of forge iron.

The making of this iron required the consumption of over 30,000,000 tons of iron ore. The great majority of the German furnaces use ore having 35 per cent iron, or less. The extra cost of fuel and handling with low-grade ores finds compensation partly in the fact that much of the ore is self-fluxing; but more in the attention given to by-products of the furnaces and to saving in every possible direction.

A Probable Arizona Consolidation.

The rapid growth of the copper interests in southern Arizona, that are owned by Lake Superior and Pittsburg mining and steel men, has been closely followed in the JOURNAL, and is well known to mining men generally. Since the Calumet & Arizona Company, the pioneer in that district, was organized, in March, 1901, it has advanced at a rapid rate, and now stands high in the list of producers, with a total for 1904 of about 32,000,000 lb. of copper. Its management, which early saw the possibilities of the Bisbee copper-bearing area, has gradually secured in four groups about 1,500 acres of adjacent land, all well located, but most of it somewhat discredited at the time it was taken under bond, and has developed this into mines. On each of these tracts work has shown either copper ore, or the most favorable conditions for finding ore at no distant date. Ever since these operations were undertaken, all by the aid of the same expert advice and direction, by a single set of officers and directors, and with identical operating management at Bisbee, it has been a foregone conclusion among stockholders that they would, in due time, become one company. The question has been as to when it was likely that this would take place. The conditions now existing seem to point to the present as a suitable time for such a combination, and there are indications that the management so considers it.

Each one of the companies organized after Calumet & Arizona is nearly ready to commence producing copper. Each one of them has a deep shaft that either has been, or is soon to be, equipped on the broad plan so well known on Lake Superior, where the managers of these mines got their experience. A smelting capacity double that from which Calumet & Arizona has made its records of production is about completed, and is to be utilized for the group. It would seem to be advisable, from many points of view, that these various companies, whose directors and officers are identical, and whose shareholders are the same, and, in many cases, with about equal proportionate holdings, should be combined. Economies are readily apparent, especially in development underground, in accounts and bookkeeping, and in the production and disposition of various ores with the smelter now belonging to Calumet & Arizona. That these advantages can be overlooked, by a management that has shown itself so capable, is not to be thought of.

While making but little noise about the operations undertaken, the management of the Calumet & Arizona Company has been careful and, to a certain extent, conservative, at the same time having abundant courage and enterprise. The work has gone on steadily, with very few setbacks, and mistakes have generally been avoided. According to those who are thoroughly acquainted with the inside history of the company, the management has been free from the scandals which have affected many mining companies in recent times. It has been a business and not a stock exchange management, and has fairly represented the stockholders generally, with no favor to special interests. In fact, it has been what one might expect in a company including so large a proportion of experienced mining men. A Calumet-Arizona consolidation would own about 1,600 acres of possible mineral-bearing ground, upon which developments in widely separated portions have already shown ore, or the probability of finding ore; it would have six shafts, averaging over 1,000 ft. in depth, some ready to begin producing ore in a short time, while two or three are now able to stope heavily. It would have ready, or almost ready, a capacity for smelting 1,400 to 1,500 tons of ore daily, with possibilities for rapid expansion. It would start with abundant working capital, and the possibility of production on a scale which would make it an important factor in the copper trade. The consolidation will be entirely a business, not a speculative matter.

THE MARKETS for metals this week present no features worth special comment. While there is no marked activity just at present, both buyers and sellers are confident of good future business. Foreign inquiry for copper continues, and European buying promises to be good. In lead, tin and spelter, consumption remains large. Silver is quiet but steady.

The iron markets are unchanged, with favorable indications for the future. In the West the coal markets are still affected by over-supply. In the East they are disturbed by bad transportation conditions.

Metallics.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The expansion and contraction of glass, in varying temperatures, is much less than that of any of the common metals.

The age of the earth, as interpreted by geology and biology, is many times greater than the superior limit set by the gravitational theory.

Only one-eighth of the railway mileage in the United States is protected by the block system. Mines can show a better record than this in safety appliances.

The linear expansion of iron is 1 in 846 per 100° C., according to the text-books, but there is variation caused by differences in the composition of the iron.

The estimated cost in England of a horse-power-year from a steam plant is $19.40; while from a water power plant, it is $8.50. Unfortunately the water-power of England is not large.

Swarf is a name given to scrap iron, as turnings or shavings, used to mix with ore in blast furnaces.

The temperature of laboratory electric furnaces seldom exceeds 2,700 or 2,800° F., even where retort carbons are used.

Platinum melts at 3,227° F., according to Viollé.

The temperature of the electric arc is not accurately known. Viollé estimated it at 6,300° F. Moissan believes that it increases with the current, and that the limiting degree is the volatilizing point of carbon.

Platinum in the Cariboo.

Attention has recently been attracted to the occurrence of metals of the platinum group in the placer gravels of the Cariboo district, in British Columbia.

The Consolidated Cariboo Hydraulic Mining Company owns a group of 34 placer leases, aggregating 2,584 acres, extending for ten miles along the south fork of the Quesnelle river, from a point four miles east of Quesnelle Forks. It is reached by a 180-mile wagon road from Ashcroft on the Canadian Pacific.

The gravel beds lie in ancient river valleys extending from Quesnelle lake westward toward the Fraser river, and range from 400 to 600 ft. in thickness. The gravel, whose qnantity is estimated at 500,000,000 cu. yd., is thought to carry about 15c. per yard. The water supply system consists of 33 miles of canals reaching to three mountain lakes that have been converted into reservoirs. The camp is thoroughly equipped in all departments. Mining is done with six No. 8 Giants, apertures 6 to 10 in., and values are collected in 3,400 ft. of partly steel-riffled sluice. Undercurrents, for the recovery of flour quicksilver and the heavy metals which resist amalgamation, are being erected at the dump.

The presence of rare metals of the platinum group in the heavy concentrate, remaining in the sluices after a clean-up, has been suspected for some years. A sample of this residue was taken last September, and was analyzed by J. O'Sullivan, of Vancouver, who reported as follows:

	Oz. per ton.	Gross value per ton of 2,000 lb.
Gold	95	$1,900.00
Silver	180	90.00
Platinum	64	832.00
Palladium	61.4	1,769,00
Osmiridium	42	1,386.00
Copper	10.5	16.56
Total value		$5,993.56

The gold and silver values are, no doubt, included in particles of pyrite and argentiferous galena, and partly in small particles of gold covered by manganese and other metallic oxides, and cannot be recovered by the process of amalgamation. The platinum, palladium and osmiridium are found in minute metallic grains and enclosed in small fragments and nuggets of magnetite and chromite, which appear to make up quite a large percentage of the sluice concentrate.

Bessemer Steel Production.

The American Iron & Steel Association has collected and presents virtually complete statistics of the production of bessemer steel ingots and castings in the United States in 1904; also of bessemer steel rails rolled by the producers of bessemer steel ingots.

The total production of bessemer steel ingots and castings in 1904 was 7,859,140 gross tons, against 8,592,829 tons in 1903, a decrease of 733,689 tons, or over 8.5 per cent. The production in 1902 was the largest in our history—9,138,363 tons.

The following table gives the production of bessemer steel ingots and castings in the last six years. Of the production last year 16,051 tons were steel castings, against 18,099 tons in 1903.

1899	7,586,354	1902	9,138,363
1900	6,684,770	1903	8,592,829
1901	8,713,302	1904	7,859,140

Below is given by States the production of bessemer ingots and castings in the last two years.

States.	1903. Gross tons	1904. Gross tons
Pennsylvania	3,909,436	3,464,650
Ohio	2,330,134	2,050,115
Illinois	1,366,569	1,257,190
Other States	986,690	1,087,185
Total	8,592,829	7,859,140

There were no Clapp-Griffiths works in operation in 1904 and only 2 Robert-Bessemer plants were active. Eleven Tropenas plants were at work, as compared with 8 in 1903. In addition two plants made steel by the Bookwalter process and five plants made steel in special bessemer converters. All these active works make a specialty of steel castings.

The production of all kinds of bessemer steel rails by the makers of bessemer steel ingots in 1904 was 2,084,438 gross tons, against a similar production in 1903 of 2,873,228 tons. The production in 1904 was 788,790 tons less than in 1903. The maximum production of bessemer steel rails by makers of bessemer ingots was reached in 1902, when 2,876,293 tons were made.

The following table gives the production by States of bessemer steel rails by the producers of bessemer steel ingots in the last two years. Included in the figures for 1904 are 11,901 tons of renewed rails rolled by mills operated by companies which manufacture bessemer ingots.

States.	1903. Gross tons	1904. Gross tons
Pennsylvania	1,185,191	801,657
Other States	1,688,037	1,282,781
Total	2,873,228	2,084,438

The following table separates the production of rails weighing 45 lb. and less than 85 lb. to the yard from those weighing less than 45 lb. and over 85 lb. to the yard. Bessemer rails made from purchased ingots or from re-rolled rails by companies which do not manufacture bessemer ingots are not included.

	1903.	1904.
Under 45 lb.	178,146	230,766
45 and under 85 lb.	1,529,580	1,190,631
85lb. and over.	1,165,502	663,041
Total	2,873,228	2,084,438

Of the rails rolled in 1904, Pennsylvania furnished 801,657 tons. From the table it will be seen that 31.8% of the total make consisted of rails over 85-lb section; while 11.1% was of light rails, of less than 45-lb. section.

The total production of rails in 1904 will include rails made from open-hearth steel, rails rolled from purchased bessemer blooms, crop ends, and "seconds," and rails re-rolled or renewed by non-producers of bessemer steel ingots, and iron rails. The total from all these sources in 1903 amounted to 119,249 tons, of which quantity 45,054 tons were open-hearth steel rails and only 667 tons were iron rails. In 1904 the total from these sources will amount to about 200,000 tons, making the total rail production for that year about 2,300,000 tons.

In 1904 this country exported 414,845 tons of steel rails and 1,405 tons of iron rails, and imported 37,776 tons of iron and steel rails.

To convert Centigrade into Fahrenheit, remember that 0° C. = 32° F., and that 5° C. are equivalent to 9° F.

A new explosive, cheddite, is said to have found favor in South Africa, where it is used in both diamond and coal mines. Among its advantages is the fact that the gases developed are not unpleasant, thus permitting a speedier return to work than when other explosives are used.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

DEFINITION OF SLIME.

The Editor:

Sir—I would like to make a few comments on the letter on this subject, signed by Mr. Herbert Megraw, in the JOURNAL of November 3. For three years I have been dealing with the slime problem in Western Australia, and I have had to do with the separation and treatment of slime and sand and the filter-press treatment of slime under most varied conditions, in quite a large number of mines. I, therefore, feel qualified to make a few comments on the subject introduced by Mr. Megraw.

As to a definition of slime, I think no natural definition can be given. Running water will float anything, from the finest kaolin to the heaviest boulders, according to the velocity and quantity of the water. Slime and sand can only be relative terms, since there is no line of demarkation between the particles floating in muddy water and the pieces of ore raised from the mine or issuing from a rock breaker—therefore, the definition is a matter of arbitrary choosing. By common usage the term slime in Western Australia, as in most other mining countries, has come to mean the fine pulp which it is considered unprofitable to leach, as distinguished from leaching sand. The separation is made according to varying economical considerations. It is quite possible to leach a considerable portion of the sand that will pass a 200-mesh screen, as Mr. Megraw says, and it is being done on a large scale on certain ores in Western Australia. The pulp of certain ores, consisting of mixed sand and slime, is leached without difficulty when the vats are filled with great care. Other ores cannot be leached by even the double-handling process until a careful separation has been made. In such cases the slime is filter-pressed or abandoned according to the value. Where slime is abandoned, the proportion is kept as low as possible; that is, as much of the fine sand is retained in the leaching vats as is possible without putting up the cost of leaching or decreasing the percentage of extraction beyond the extractable value of the fines so included. Where it is possible to eliminate an unpayable slime from the leaching sand, it is being done on most mines that have come under my observation. I have more frequently observed, however, that the finest floating slime carries as much, or even more, value than the fine sand or grit. Where such slime contains sufficient value to warrant filter-press treatment, it is advisable to include sufficient grit in the product to cheapen the cost of filtering, and to improve the extraction and cheapen the cost of leaching the coarser sands, by improving in each process the facilities for drawing off and washing out the gold solution. Where it is necessary to filter-press slimes it is quite impracticable to remove from the slime the fine sand that will pass a 200-mesh screen for the reasons mentioned above, and because the remaining floated slime, after separation of the grit, is practically unleachable, even in the filter-press. The items governing the cost of filter-pressing, such as thickness of filter-press cake and the time and efficiency of washing, are regulated wholly by the coarseness or porosity of the material filter-pressed.

The production of slime is generally an incidental result of crushing ore for leaching or amalgamating purposes. There is, however, a large percentage of gold ore in the world that will not yield its gold to cyanide solutions until the product is reduced to such a degree of fineness that ordinary leaching is out of the question, and for various local reasons filter-pressing is preferable to decantation. For example, most of the Kalgoorlie ores come under this class.

The most economical results are obtained at several of the Kalgoorlie mines when the ore is ground until not more than 0.5% remains on a 200-mesh sieve. Two or 3% remaining on a 200-mesh screen will generally put up the average residues one or two dollars (or pennyweights) per ton. For such ores no treatment yet tried will give such economical results as the agitation and filter-press process.

W. A. PRICHARD.

Kalgoorlie, W. A., Dec. 22, 1904.

CHLORINATION *vs.* CYANIDATION.

The Editor:

Sir—I venture to submit that there is no such process in existence as electro-chlorination, nor is there likely to be. The electrolytic production of chlorine for the manufacture of bleach or liquid chlorine might just as well be called an electro-chlorination process if these chemicals are subsequently used to chlorinate gold ores; hence Mr. Greenawalt's so-called "electro-chlorination process," or the alleged "new chlorination," constitute meaningless and unnecessary terms, because they resolve themselves into the well-known electrolytic production of chlorine—a process as suitable for the manufacture of bleach as for the chlorination of gold ores. This process, though extensively used in the chemical industry, and no doubt in many cases profitably, is nevertheless to a large extent still in the experimental stage. New cells, porous diaphragms, anodes, furnaces, etc., are constantly coming out, yet there is ample room for further improvement. If the Greenawalt cell has superior merits (a matter I do not call in question), there is no doubt a wide and profitable field for such an invention in the chemical and alkali trade. Should Mr. Greenawalt, however, persist in his attempt to resuscitate a dying process like barrel chlorination, I would respectfully suggest that he devote some of his energies to the production of a deodorized non-corrosive chlorine, which is really the *sine qua non* for present day chlorination. There is always a leak somewhere, making, as Mr. Gibbs so aptly describes, "the barrel room unbearable," if not from the cover, it may be from the cell, the bung or the spigot, from settling tanks, or from everywhere, when the exhaust fan stops, filling the building with deadly corrosive fumes, which attack all exposed metal and destroy the fiber of the woodwork. When process men come out frankly, as Mr. Gibbs does, in describing the drastic effect of a small leak in the three-cell experimental plant of a 300-ton mill, one can readily imagine what inconveniences the unfortunate barrel-men frequently have to undergo.

I am very sorry I was misled regarding the size of Mr. Greenawalt's Colorado City plant, which, by the way, I have never seen. The facts are, I had some very general information regarding a line of plants extending from Black Hawk through Boulder county to Colorado City, with which the name "Greenawalt" was connected, whether in each case that of my critic or some other Greenawalt, I know not. These plants appeared to have two attributes in common; they had not apparently emerged from the experimental stage, and they were all idle. I selected the one at Colorado City, not on account of its size, but because it appeared to have a more direct bearing on the point at issue.

I had no idea when I started this friendly discussion that I would be called upon to write a kindergarten essay on modern cyanide practice; but I see no way of escape, and must go through with the business in order to convince my critic that not alone the ridicule for "rashly venturing to write on matters regarding which he is not accurately informed" rests squarely on his own shoulders, but also that of advocating obsolete methods of ore treatment, which he very disingenuously tries to place on my back.

For the enlightenment of Mr. Greenawalt, I clearly stated, in the JOURNAL of December 29, the cost of fine crushing, sliming the battery sands at the Oroya Brownhill mine, and also the cost of filter-pressing the said slime "after the gold is dissolved by cyanide," the two items amounting to 83.5c. per ton. Mr. Greenawalt, however, in his airy manner and usual reckless disregard of the many items that go to make up the total cost in any given process, assumes that "sliming and filter-pressing" are the *total cost* of the entire process, just as he did in getting together a few straggling items for his *total* chlorination costs.

To the steps I noted in the Oroya

Brownhill ore treatment we must add crushing, stamping (reducing the ore to sand), cost of cyanide and bromo-cyanogen, agitation, disposing of residues, marketing the bullion, etc., in order to arrive at the total treatment cost which is given by Mr. Alfred James, in the JOURNAL of January 5, as about $3.84 per ton. The cost for last month is $4.26, exclusive of depreciation of machinery and plant, the amount treated during December being 9,155 tons. This is about $2.00 per ton above my total cost of cyaniding Cripple Creek sulpho-telluride ores, on a basis of 150,000 tons per annum. Mr. Greenawalt doubts my ability to cyanide Cripple Creek ores for $2.20 per ton total cost, while willing to admit the possibility of cyaniding somewhat similar ores in Westralia for 83.5c. per ton. His position is surely not logical, but not less so, perhaps, than his usual position in this controversy.

I believe Professor Christy is far too well informed to be perplexed with the iron "in such fine grinding with the arrastra." He at least knows, if Mr. Greenawalt does not, that the only iron contained in the arrastra pulp is that fed to the machine with the unground ore.

PHILIP ARGALL.

Denver, Colo., Jan. 28, 1905.

GEOLOGY OF THE SUDBURY DISTRICT.

The Editor:

Sir—Replying to Mr. A. P. Coleman, in your issue of January 26, I wish to preface my remarks with some statements: (1) Truth will prevail in spite of pet theories; (2) one should expect to give and take sound whacks without losing his temper, remembering that "whom the gods would destroy they first make mad."

Mr. Coleman remarks: "He is evidently not aware that geologists do not worry about the planetary history of the earth," etc. Perhaps I have taken too much for granted in supposing that the nebular hypothesis, as developed by Kant, Humboldt, Laplace, Haeckel and modern authorities is generally accepted by geologists.

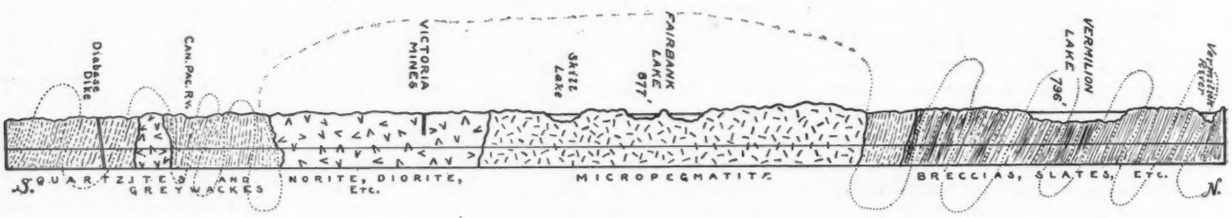
The survival of the fittest prevails among theories the same as with other things, and if at some future time a more rational explanation is offered, it will survive, and the others will be rejected by advanced thinkers. Taking this view of the matter, I quote from Haeckel's 'Riddle of the Universe': "It (the nebular hypothesis) has recently been strongly confirmed and enlarged by the theory that this cosmogonic process did not simply take place once, but is periodically repeated. While new cosmic bodies arise and develop out of rotating masses of nebula in some parts of the universe, in other parts, old, extinct, frigid suns come into collision and are once more reduced by the heat generated to the condition of nebula."

With this rational explanation of the development, decline and re-development of our world, a satellite of the sun, let us follow the chemical combinations that would presumably result from the union of the elements composing it. As a highly-heated, self-luminous sun in the early stages of its life, everything which could combine with oxygen to form the more solid non-volatile combinations would naturally gravitate toward the center. Those elements which formed gaseous or volatile combinations with oxygen or other elements remained in what may be called the atmosphere. Therefore, such elements as carbon, hydrogen, sulphur, chlorine, etc., were in the highly heated atmosphere as CO_2, CO, H_2O, SO_2, H_2SO_4, HCl, etc. This atmosphere, containing all the water which is now in the ocean, as well as the great quantity which has since been absorbed into the crust of the earth, must have exerted a pressure of several tons to the square inch (instead of the 15 lb. of the present), and was correspondingly active as a chemical and erosive agent.

By this reasoning one arrives at the conclusion (as stated in my first article) that the persistence of sulphide of iron *as such* through the planetary history of the earth would be impossible, owing to the presence of an excess of free oxygen. Having arrived at this conclusion, all theory about its separation from a molten magma has to go, as does the pollywog's tail when he abandons his aquatic habits. A theory of the formation of metallic sulphides is found when we try to explain the occurrence of sulphide of iron along with coal. It is evidently not of igneous origin, as the coal and the enclosing sedimentary rocks are evidence sufficient to prove the absence of volcanic action. It has, therefore, been brought there in solution as a sulphate, being subsequently reduced and precipitated as a sulphide by the action of organic matter. It is reasonable to suppose that the reducing agent has much to do with determining whether a pyrite or a pyrrhotite will result. It is worthy of note that in all sulphide bodies deposited in or near coal or limestone formations, the iron is a pyrite, and where deposited in eruptive rock, away from contact with such powerful reducing agents, it is generally a pyrrhotite. Concentration of such bodies of metallic sulphides, along lines of fracture and movement in the diorite, is explained by the leaching of the nickel, iron and copper from the eruptive rock in which they have existed as oxides or silicates. These sulphate solutions have been reduced by decomposed steam, or some other reducing agent, and the sulphides deposited in the place of soluble material removed. The igneous rock has furnished the metals and the necessary heat to promote chemical action.

Referring to Mr. Coleman's statement that the rocks represented in my section are "simply the country rocks on which the nickel-bearing eruptive rests," I wish to call attention to the cross-section of the geological map of the Sudbury region. This is on a slightly different line from the former one, and is longer, but in the main they are in agreement; it distinctly shows that the sedimentary series have been folded and eroded in the same manner that I illustrated. It further shows that the eruptive does *not* lie on top of the sedimentary, and consequently is not an overflow, but an intrusion exposed by erosion and glaciation of the anticlinal folds of the sedimentary. It shows also what the former section did not, namely, that the valley of the Vermilion river around Vermilion lake, and extending 25 miles northeast, is one vast trough or synclinal fold, occupied by the same sedimentary rocks as on the south of the eruptive intrusion, and that a section across this intrusion on any side of this valley will show practically the same relation between the sedimentary and the intrusion. The eruptive is therefore shown to be the core of a mountain ridge surrounding a vast synclinal fold in the Vermilion valley; a section across this core will show it surrounded and enclosed in the slates and quartzites.

Regarding the rusty edges of that vast norite funnel, which Mr. Coleman says is visible from my rock-house, and which, if it had not leaked, would have resulted in retaining the ore now in the Worthington mine, four miles away, "it is to



CROSS SECTION OF VICTORIA MINES AREA.

laugh." More might be said, but it would be irrelevant and unscientific.

HIRAM W. HIXON.

Victoria Mines, Ont., Jan. 30, 1905.

ORE DEPOSITS.

The Editor:

Sir—I hope that discussion of this subject may be continued; it is evidence of the vigor of American mining research, and stimulates further observation. In this connection, I have been re-reading the papers by Van Hise, Purington, Kemp, yourself, and others. May I note several field observations? These are, the Golden Age mine at Jamestown (Boulder county, Colorado); and the 'iron dike' at Caribou in the same county.

The capricious richness of Golden Age ore is a matter of historic wonder. A specimen, exhibited in Boulder about ten years ago, was of the shape and size of a small brick, about 6 in. by 4 in. by 3 in. It consisted of solid, white, sparry quartz, interleaved with two thick plates or slabs of massive gold, one of which was about 0.25 in. thick, and the other about 0.5 in. The polished edges showed on all four lateral surfaces of the brick, which was sawed to shape. The whole specimen was one admirably suited to simulate magmatic separation in the sparry quartz. But there is one fact to be considered, namely, the white, sparry quartz was itself presumably a secondary product. I never analyzed nor sliced that particular piece of quartz; but I have no doubt that it consisted of free quartz, made white and opaque by kaolin dust. Now this is too obvious a relic of former feldspar and its alteration to be overlooked. Hot water could leave the kaolin-charged quartz with the gold, and even in massive form. Barring the rarity of gold, there is nothing in its chemistry to preclude any such inference.

Again, the Caribou iron dike[1], on examination, was found to be an increasingly basic series of diabase which culminated in condensed masses of titaniferous iron; these, on slicing, showed about 6% of augite, the rest being a menaccanite-like iron with about 1% of a black substance which matched the composition of rutile. This rock differentiation is an end member without feldspar, but consisting almost entirely of titaniferous magnetite with a little augite; it was a puzzle until I chanced upon the valuable paper of J. F. Kemp[2] on a similar find in the Adirondacks. It appears to be only a confirmation of the logic of Prof. Kemp in this matter of magmatic segregation.

The writers mentioned seem to have divided well, between the *source* of heavy metals on the one hand, and the *agents* on the other. The source is in the eruptive rock from the depths, which is presumably metalliferous ex-officio. But the agents of concentration are two or more; first, the motive power, which comes from the heat of the eruptive rock, which is partly due to the energy factor of gravitative condensation; second, volatile gases, both steam and others, as fluorine, chlorine, sulphur and their compounds—but chiefly steam or hot water. And here, perhaps, is a curious confusion. Where does the water come from?—both from above and below. That water can, and does, circulate, is rational. That hot rocks carry some water, and especially at the time of intrusion and eruption, is evidenced by many phenomena. Pressure is attendant, of course—it could not be otherwise; but as to the main source of the circulating water, it reminds one of the maiden who remarked naively that she could count only twelve chicks in the brood, but there was another one, the thirteenth, which ran around so quickly that she could not count it. The circulating water would seem, not inaptly, to personate the thirteenth chick. We may be unconsciously dominated by the classic concept of a hot, dry, metalliferous, reduced interior of the earth, clothed by the slaggy, oxidized, wet, and cold crust. The water will always tend to sink into the earth; the internal heat will always tend to distill it back. But the interior is the permanent source and home of heat; the crust is the permanent home of water. There must be a mix-up of these conditions in many extrusions, intrusions or eruptions; and perhaps water may be the effective material cause. Water will sink when it can; it will retreat, as it must, before the heat. In your own apt illustration of the circulating water-system, it will ascend and descend; but it will do its work both of concentration and, be it noted, of attenuation also. Prof. Van Hise has admirably illustrated the action and result of the descending plan. Prof. Kemp has vividly balanced the work of intrusive rock and of meteoric water. Many deep mines are dry at the bottom, showing that water does not permanently reside there. Auriferous quartz carries kaolin, a fact that must not be overlooked on the one hand; neither should magmatoid menaccanite be ignored on the other. Moreover, one must retain the difference between the material agent, water, and the immaterial agent, heat energy.

We must look for a long period of growth in the recognition of the factors and conditions of ore deposits. We do not yet feel sure as to the effective agents of volcanic disturbance, but heat and water both seem suspiciously close to the answer. The problem of ore deposits is both physical and chemical, and the geologist certainly has his hands full.

Incidentally some of the writers speak of a substance above its critical point (water, for example, above 365° C.), as being a "perfect gas." It should be remembered that such gases under such conditions are permanent, not "perfect," gases. A perfect gas would be one that would obey absolutely the gas law $PV = RT$, without viscosity. Most gases show viscosity under great pressure, even when above the critical temperature. I do not know of any perfect gas, though some writers speak of hydrogen under some conditions as being "a more-than-perfect gas"; "but that is another story." Hot steam under pressure can be an effective agent in dissolving, transporting, and even vaporizing many substances considered as non-volatile and insoluble. How this happens and when, is what we wish to know. Liquid carbon dioxide is found in cavities in quartz; its critical point is 30.9° C. (87° F.), and the critical tension is 77 atmospheres (1,185 lb. per sq. in.). But carbon dioxide might have been encased in the quartz cavity as a condensed viscous gas. The relation to this of condensed and viscous water-vapor near its own critical point (365° C.) is a gap in the logic. Such water-vapor might carry a large burden in peculiar suspension. Indeed, it is possible that such a condition might be neither that of meteoric water nor of magmatic segregation from an intrusive rock, simply; but a new condition, demanding a new conception, and a new name. Obviously no one can afford to be dogmatic in a field where the chemical activity is great, the pressure is greater, and our ignorance is greatest of all.

STUDENT.

Boston, Jan. 28, 1905.

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[1] From an unpublished paper.

[2] 'The Titaniferous Rocks of the Adirondacks,' Nineteenth Annual Report' of the United States Geological Survey.

In making an electric furnace with limestone blocks, it is necessary to dry them in a stove or otherwise for 10 to 24 hours, as the least moisture will cause a block to crack when subjected to the heat of the arc.

The heating properties of a special coal depend mainly upon the carbon content, the oxygen being usually of no value, because it is combined with hydrogen as water. In gas coals, however, the excess of hydrogen is a material factor in heat production.

Occasionally a mine-shaft is 'sunk upward,' to use a paradoxical expression, for some special reason. The shaft is divided temporarily by brattice-work, the space on one side being filled with excavated rock, and forming a platform for the men.

A Dresden (Germany) suburban line is using cars, which carry 98 passengers, each car being operated by 184 cells under the seats. There are four axles each with a 4-pole motor. The battery gives 430 amp. hr., at 140-amp. discharge, and with a potential of 370 volts.

Mining Stocks.

(Full quotations on pages 343 and 344.

New York. Feb. 15.

The stock market has had a holiday aspect since last Friday, and judging by the trading, the professional element is still "fishing" for public investors. While it appears opportune at ruling low quotations to invest in the proved properties, there seems to be a disposition on the part of outsiders to keep out. Certainly, the fluctuation in Amalgamated Copper between $74 and $75 on moderate dealing does not suggest an early revival in speculation. Since the declaration of the 1% quarterly dividend, this stock has moved rather systematically. Anaconda has made small sales at $26.50. On curb Greene Consolidated stood at $26.25@$26.875, and Tennessee at $31@$33.50.

The gold and silver shares were uninteresting.

Attention has been called to the shares of the Federal Mining & Smelting Co. From $76 the common stock rose to $92, and the preferred from $85.50 to $93. A peculiarity about the trading is that there is very little difference between the quotations, although the preferred stock yields an annual dividend of $7 and the common only $6. From appearances an effort is being made to "standardize" the quotations, in accordance with the custom of other properties that are represented by the two kinds of shares.

Recent auction sales were 100 shares Eureka Oil Co., at $3 for lot; 50 shares Hecla Mining Co., and 696 shares Commonwealth Reduction Co., at $82.50 lot; $200 6% income bond, due Jan., 1917, of St. Louis Ore & Steel Co., $2 lot; 100 shares Seminole Mining Co., $20 lot; 30 2d preferred shares Carbon Steel Co., of West Virginia, $35.50; 450 preferred shares Houston Oil Co. of Texas, $15.50.

Boston. Feb. 14.

The market for mining stocks here is dull and inactive, although there are evidences of increasing interest in some stocks. The producers of copper are well sold ahead, which tends to keep the eyes of prospective investors on the situation. Outside of the slump in Osceola to $88 on Thursday, on the announcement of the explosion and fire, there is little in the happenings of the past week to comment upon. The stock is off but $1.25 for the week, as it closed at $92. This shows that the stock is well held, and can be depressed only temporarily at least. Boston Consolidated has been well taken and is up from $6.50 to $7.12½. This company is now shipping 300 tons of ore per day to the Bingham smelter for treatment. Greene Consolidated is fractionally higher, at $26.87½. Current report states that this company is now earning at the rate of $4.75 per share per annum. Old Dominion is slightly higher, at $27. It seems probable that a dividend may be declared this year, if the present price of copper holds.

Trinity has been quiet, selling fractionally above and below $11, although it is felt that there may be skyrockets in this stock at most any time. General Manager Brown is now in this city, and was in conference with President Lawson this afternoon regarding the smelter proposition. It is learned that a Mexican property is to be absorbed by the Trinity. United States Mining is firmer, at $24, being up a fraction from last week. Current report has it that Director Lewissohn, who is having an examination of the property made for his own benefit, has received a favorable report. Mass mining was taken hold of last week and touched $12.50. The next installment of the assessment is due June 1. It is now said that the annual report will be favorable. Copper Range has been quiet, but firm, closing higher, at $69.50. The talk now is that a $1 dividend will be declared in March. Centennial spurted $2.37½, on very slight dealings, to $19.87½. No decision relative to an assessment has been arrived at as yet.

Wolverine touched $113.25, which is its highest record. The next dividend, to be paid April 1, is expected to be increased to $5 per share. Utah Consolidated has been quiet, at from $42.12½ to $41.50. Allouez has improved to $20.50; Isle Royale to $25.50; Michigan to $13, and Mohawk to $52.75. Amalgamated closes the same in this market as it did a week ago, at $74.25. The Parrot 50c. dividend did not bring any market for the stock. On the curb Ahmeek is quoted $47@$48; Arizona Commercial (new), $10.37½@$10.75; St. Mary's Mineral Land, $65@$66 per share.

Salt Lake City. Feb. 10.

Trading in mining stocks during the past week has not been very brisk. Insiders were buying New York again, which had the effect of holding the price rather steady. Daly-West was not sought, although a few shares changed hands. Consolidated Mercur stiffened on the strength of physical conditions which seem to be improving. Some demand was shown for Boston Consolidated and United States, but no transfers were recorded. Managing Director Newhouse, upon his return from New York, announced that it is the company's intention to open the copper-bearing porphyries contained in its property, and will commence the construction of a concentrating mill, as soon as the plans are prepared and the contracts let for material and equipment, which will be in the near future. The United States mines have been subjected to a rigid examination by J. Parke Channing, who will leave for New York to prepare his reports during the coming week. He was sent here by the Lewissohn interests. Silver Shield of Bingham has been active at stiffer figures. The directors of the Uncle Sam Consolidated met this week and decided to pass the dividend for another month. The stock, nevertheless, has been active and strong. The company is conducting an important campaign of development, and substantial results are anticipated soon. Some extensive shipments of high-grade ore and concentrates have been made during the week.

San Francisco. Feb. 9.

Dealings in the Comstock shares were large during the week, and some of them reached a high level. Towards the close, however, the market was inclined to be weak, and the bears had an opportunity. Some quotations noted are: Ophir, $7.25 @ $7; Consolidated California & Virginia, $2.10 @ $2.05; Hale & Norcross, $1.40; Mexican, $2.15; Sierra Nevada, 40c.; Savage, 40c. per share. Dealing in the Tonopah and Goldfield stocks on the old exchange is increasing.

On the San Francisco & Tonopah exchange business was active, and quotations were generally strong, with a tendency to advance. Montana Tonopah brought $2.55 @ $2.70; Goldfield, 80c.; Tonopah Belmont, 64c.; Sandstorm, 64c.; Original Bullfrog, 48c.; Red Top, 24c. per share.

On the California exchange dealing in oil shares was rather light, but prices were comparatively steady. Peerless was quoted at $15, and West Shore, $1.75.

Coal Trade Review.

NEW YORK, Feb. 15.

ANTHRACITE.

Traffic in and around New York remains as difficult as ever, although supplies are arriving regularly at the New Jersey side. Through transportation to the North has not suffered as much delay by the weather as that from the West; Montreal reports a snowfall not only actually less than this city's, but also of such dry snow that its removal is not difficult. Philadelphia is totally closed to navigation, and tows along the Sound and to Boston and Portland require an abnormal length of time.

Prices at the harbor shipping points have not been affected, although the expense of ferrying, unloading and distributing has greatly increased. Domestic sizes sell at the receiving ports for $4.75 broken, and $5 for egg; steam sizes range $3 for pea, $2.25@$2.50 for buckwheat, $1.45@$1.50 for rice and $1.30@$1.35 for barley.

The following statement shows the production of the different anthracite companies for the month of January:

	1904		1905	
	Tons.	Per ct.	Tons.	Per ct.
Reading	879,827	21.3	871,596	19.8
Lehigh Valley	685,884	16.6	763,134	17.3
N. J. Central	524,039	12.6	559,890	12.7
Del., Lack. & W.	681,713	16.5	665,662	15.1
Del. & Hudson	434,736	10.5	445,492	10.1
Pennsylvania	337,990	8.2	360,078	8.2
Erie	326,881	7.9	423,481	9.6
Ontario & West.	180,031	4.4	212,856	4.8
Del., Sus. & Sch.	83,144	2.0	106,389	2.4
Totals	4,134,245	100.0	4,408,578	100.0

This shows an increase this year of 274,333 tons, or 6.4 per cent. over last year's large January shipments. The result is very good, considering the various hindrances to transportation, which affected the trade during the month.

BITUMINOUS.

The Atlantic seabord soft coal trade is influenced first of all by the weather and ice conditions. The market itself is speculative, but transportation on land being better than on water, the supply of coal available at tidewater shipping points is as great as the vessels at hand can take care of; for this reason the price of coal is lower than might be expected. Prices, f. o. b. New York harbor point, range from $2.65 for the lower grades up to around $3 for the better.

Transportation by water is so difficult that captains and owners do not like to move their vessels at all. We are told that tows coming through Long Island Sound encounter ice all the way from New London to New York, and disasters to all kinds of vessels are constantly occurring. The shipping points report unusual difficulty in unloading, owing to the hard-frozen condition of the coal in the cars.

Trade in the far East shows many orders in the hands of shippers, but this district seems to be in a state better prepared to withhold taking coal than any other territory, and accordingly will wait until more propitious times.

Trade along the Sound is calling for great quantities of coal, but its transportation facilities are extremely bad, owing partly to the difficulty of shipping, but more particularly to the congested condition of the New York, New Haven & Hartford railroad, at its receiving ports. It is said that vessels arriving at some of these harbors have to wait three weeks for a chance to dock, with demurrage accruing all the time.

Trade in New York harbor is speculative; middle men who have cargoes afloat

demand high prices. All-rail business is active, and prices are strong. Transportation between mines and tidewater is much better than would be expected, judging by the weather. The car supply remains at less than one-quarter of the needs.

In the coastwise trade, none but the largest vessels are ready for business, and these are not numerous. Rates seem to be about 90c. @ $1 from the lower ports to around the Capes, and 75c. @ 80c. from New York harbor to the same points.

Birmingham. Feb. 13.

The presence of President John Mitchell, of the United Mine Workers of America, in Alabama, did not accomplish anything toward settling the strike of the union miners which has been on now since last July. President Mitchell made several speeches, urging the miners and mine workers to stick together, telling them they would gain in the long run. There was no conference between President Mitchell and mine operators during his stay, and it is given out that the mining companies will continue their ideas of operating mines on the "open shop" plan.

The coal production in Alabama is holding up well. The cold and rainy weather has had a little effect during the past week on the production. State Mine Inspector J. M. Gray is now completing his figures of last year's output. A few mines are still to be heard from. The report so far shows 11,700,000 odd tons. It was believed that the production would go above 12,000 000 tons, but that sum will hardly be reached.

The Burnwell Coal Co. has been organized by W. J. Francis, representing Cincinnati capital. The capital stock is $50,000; 1,300 acres of coal lands in Walker county have been purchased, and mines are now being opened. Assistant State Mine Inspector James Hillhouse during the past week made an inspection of the coal mines in the extreme western part of Jefferson county, and he reports that the mines in that section of Alabama are in fine shape and producing a large quantity of coal. There is considerable development under way now in the western part of the county and across the Warrior river into Walker county. It is understood that three or four new coal companies are in contemplation and will be organized in the next few weeks.

Cleveland. Feb. 14.

The coal trade is still depressed, under a constant flow of coal into this territory. Prices have now sagged back to the midsummer level and the trade is slow. There is a constant pressure to wipe out the middlemen and to increase the profits of the producing companies by direct sales. The market eased off again during the past week, with run-of-mine steam coal selling at the Ohio and Pennsylvania mines at 95c.@$1 at mine. This is largely due to the surplusage of coal in this territory. The consumption is still heavy, but the mines are showing increased evidence of over-production for the current market. There is a somewhat better demand for slack. The Pittsburg mines have about sold out, and their slack is scarce. They are getting 75@80c. at mine for it. Ohio slack is more abundant, however, and prices are easier, running about 65c. at mine. The demand for domestic coal in this territory is steady. The influence of some of the new mines is beginning to make itself felt, and the pressure of competition is having a good deal to do with the current prices. The market is firm, however, at midsummer prices of $2.30 for selected lump at mine, with other grades based on that price.

The coke market is a little easier and the supply is abundant. There is a tendency toward lower prices. The best 72-hour foundry coke is selling $2.75@$3 at the oven, while furnace coke is free and easy at $2.40@$2.65 at the oven. The Lake coal shippers have not yet met to decide the question of prices for Lake shipments during the year.

Pittsburg. Feb. 14.

Coal.—There is but little change in the coal market. Mines are being operated irregularly, owing to the lack of railroad cars, but the demand is being met with little trouble, and prices have not stiffened. Preparations are being made for a big shipment by river as soon as the ice passes out of the streams. There are a number of heavy gorges in the Monongahela river, and it is likely that considerable damage will be done before the rivers are navigable. Prices remain about the same, based on run-of-mine at $1.10 a ton.

Connellsville Coke.—The demand for coke continues about the same and prices are unchanged, furnace coke still being quoted at $2.50@$2.75, and foundry at $2.85@$3.10. The car supply was somewhat better last week, and the shipments were greater than the previous week, but the production fell off somewhat. The production for the week is given at 259,056 tons, a decrease of 2,656 tons. The shipments aggregated 10,833 cars, distributed as follows: To Pittsburg and river points, 4,103 cars; to points west of Pittsburg, 5,540 cars; to points east of Everson, 1,190 cars. This was an increase of 250 cars compared with the preceding week.

San Francisco. Feb. 9.

The local coal trade continues quiet but steady. No material change in prices is noted.

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $4. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14, and Cumberland $13. For English coal, quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Feb. 8.

Imports of fuel into Germany for the year were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	6,766,513	7,299,042	I. 532,529
Brown coal	7,962,123	7,669,099	D. 293,024
Coke	432,812	550,302	I. 117,490
Totals	15,161,448	15,518,445	I. 356,995

The largest imports of coal were from Great Britain; while the brown coal, or lignite, was practically all from Austria. The coke was chiefly from Belgium.

Exports of fuel from Germany for the year were as follows, in metric tons:

	1903.	1904.	Changes.
Coal	17,389,934	17,996,726	I. 606,792
Brown coal	22,499	22,135	D. 364
Coke	2,523,351	2,716,855	I. 193,504
Totals	19,935,784	20,735,716	I. 799,932

The large shipments of coal last year were to Austria, Holland, Belgium France and Switzerland; of coke to France and Russia. The German trade is nearly all with adjacent countries. There were 27,901 tons of coke shipped to the United States.

The coal production of Germany for the full year is reported as follows, in metric tons:

	1903.	1904.	Changes.
Coal	116,637,765	120,694,098	I. 4,056,333
Brown coal	45,819,488	48,500,222	I. 2,680,734
Total mined	162,457,253	169,194,320	I. 6,737,067
Coke made	11,509,259	12,331,163	I. 821,904
Briquettes made	10,476,170	11,413,469	I. 937,299

Of the coal mined last year, 112,808,409 tons of coal, and 41,126,856 tons of brown coal, or lignite, were from the mines of Prussia.

The output of coal in the Nord and Pas-de-Calais, in France, was as follows, for the full year, in metric tons:

	1903.	1904.	Changes.
Nord	6,323,828	6,409,483	I. 85,655
Pas-de-Calais	16,595,781	16,303,515	D. 292,266
Totals	22,919,609	22,712,998	D. 206,611

These two districts supply more than four-fifths of all the coal mined in France. The decrease was 0.9%; that is, the production was nearly stationary.

From official statistics it appears that the French railway systems in 1904 consumed 5,488,000 tons of coal, distributed as follows: Paris-Lyons Mediterranean, 1,384,000 tons; Northern, 1,032,000 tons; Orleans, 824,000 tons; Eastern, 773,000 tons; Western, 745,000 tons; Southern, 381,000 tons; and State, 242,000 tons. The Northern system naturally uses the coal from the fields in its territory, but the other lines are largely dependent upon foreign supplies, the State taking as much as 82 per cent. from foreign sources. Prices paid range from $4.29 on the State lines to $3.24 on the Northern Railway.

A contract has been closed to supply 45,000 tons of Welsh steam coal to the Paris, Lyons & Mediterranean railroad. The coal will be shipped from Cardiff. The price is $4.92 per ton, delivered at Marseilles.

Iron Trade Review.

NEW YORK, Feb. 15.

While there is no special change to be noted in the iron trade, enough business has been done to make it clear that an enormous trade is in sight. New orders are usually not plentiful at this time of year, but mills generally are full, and new business continues to come in.

In pig iron, production is at the highest level ever known, but demand continues steady. The large steel companies have nearly every available furnace in blast, and the merchant furnaces everywhere are busy, with plenty of orders ahead. Prices do not change, but there is beginning to be some talk of premiums for early deliveries, and undoubtedly these have been paid here and there by belated buyers.

In finished material, all the mills are busy, and most of them have orders for a long time ahead. The exception is found with the rail mills, where future business continues to come in very slowly. The important railroad companies have ordered only moderately, and undoubtedly will have further requirements this year, but they seem to be in no hurry about it. The special demand reported just now is for plates, and comes largely from the builders of steel cars. Structural material is improving. There are already heavy orders in sight for bridge work, and building promises much better than it did last year. There is less talk of labor troubles, and a great many projects are being worked out.

Meetings of the plate and beam pools are to be held in New York this week to consider the question of prices. It is not believed at present that there will be any change. It is understood that the United States Steel Corporation is once more in the position of desiring to hold down prices to the present level, and does not want to see any rapid advances.

Iron ore contracts are now pretty well placed for the season, and the level of prices may be regarded as fixed. The question of lake rates has not yet been settled, but it seems probable that the basis will be 75 or 80c. from the head of Lake Superior to the Lake Erie ports.

Pig Iron Production.—The reports of the blast furnaces for February show a marked increase in activity. The total number of coke and anthracite furnaces in blast on Feb. 1 was 257, having a total weekly capacity of 404,300 tons, which is an increase of 26,300 tons over Jan. 1. To this is to be added the output of the charcoal furnaces, which would bring up the total to 425,300 tons. That is, we are now making iron at the rate of over 22,000,000 tons yearly. The estimate of actual production in January, made by the *Iron Age*, which collects these figures, is 1,776,600 tons.

Unsold stocks on Feb. 1 are reported at 372,200 tons, which is a decrease of 30,800 tons from the quantity reported on Jan. 1. These stocks include only iron for sale, and not pig held by the steel companies for their own use.

Birmingham. Feb. 13.

Alabama furnacemen sold a large quantity of pig iron during the past week and many inquiries are still being received. It is stated that one order for 20,000 tons of foundry iron was placed in this district, delivery to be made within the next four months. The president of one of the larger companies states that his company has received orders for 40,000 tons of iron. Prices are still firm. As far as can be learned, there is no inclination to sell No. 2 under $13.50 per ton, though rumors were heard that sales were made the first of the past week at $13 and $13.25 per ton; no admissions on this score are obtainable.

The following quotations are given in this district: No. 1 foundry, $14@$14.25; No. 2 foundry, $13.50@$14; No. 3 foundry, $13@$13.25; No. 4 foundry, $12.50@$12.75; gray forge, $12@$12.25; No. 1 soft, $14 @$14.25; No. 2 soft, $13.50@$14.

The output during the past week was good, considering the weather which prevailed. The Alabama Consolidated Coal & Iron Co. is again making iron at its big furnace at Gadsden. No. 1 city furnace of the Sloss-Sheffield Steel & Iron Co., which resumed operations after two or three months' idleness, during which time it was thoroughly repaired, has been producing more than 200 tons of iron daily. The Tennessee Coal, Iron & Railroad Co. is preparing to blow in two furnaces at Bessemer shortly.

There is less than 25,000 tons of iron in the yards in this district which could be delivered on short notice. A statement was printed on Saturday that one company in this district has 40,000 tons of iron ready for immediate delivery, but inquiry failed to back up the statement.

There is no change in the steel situation. The activity which has been reported in the past continues. The Tennessee Co. is preparing for further improvements the steel plant at Ensley. All the railroad tracks in the steel plant yards will be taken up with the exception of one line in and out of the works in order to give room for the proposed improvements. At the Gadsden steel plant, of the Alabama Steel & Wire Co., the work of enlarging the plant is being pushed steadily.

Nothing can be added to the statement of progress being made at the cast-iron pipe works in this district. The plants are running to their capacities.

Col. T. G. Bush, president of the Alabama Consolidated Coal & Iron Co., announces that, while it is proposed to erect a new blast furnace and make other improvements, so far nothing definite has been decided on.

Cleveland. Feb. 14.

Iron Ore.—Sales have about stopped for the time being, consumers of ore having satisfied their needs for the time being. Further sales will be made in large amounts during the summer, but at present buying is confined to small lots, on which the price does not change much. The quotations are about $3.75 for bessemer old range, $3.50 for bessemer Mesabi, $3.25 for non-bessemer old range, and $2 for non-bessemer Mesabi. Nothing has been done about fixing rates for the season. Shippers are asking 75c. from the head of the lakes, and the vessel-owners are holding for 85c. The compromise will probably be on a basis of 80c. from Duluth to Ohio ports.

Pig Iron.—Very little is being done in the matter of sales of the foundry grades. The furnaces are taking some good orders now and then, but not many large contracts. Most of the material now bought is for second-quarter delivery; most of the sales being on the old basis of $16 in the Valleys for No. 2. A little material for spot shipment is being sold now and then on the same basis. One or two furnaces report heavy contracts for second-half delivery on the same basis, but generally they are not selling for that delivery. The market is spotty and uneven, without any definite trend. Southern furnaces are holding for $13.50, Birmingham, for No. 2. A little bessemer and basic is being sold now and then to small consumers on the basis of $16 in the Valleys.

New York. Feb. 15.

Pig Iron.—The market has improved, and a good deal of local buying is reported, some of it from concerns which were not expected to need more iron for a month or two. Everything indicates that the consumption is large. Southern iron shows a much better demand.

Prices have not changed materially, and we quote as follows: No. 1 X foundry, $17.75; No. 2 X, $17.50; No. 2 plain, $16.75; gray forge, $16.50. Southern iron is firm, but no material change in price can be given. We continue to quote for large lots on dock: No. 1 foundry, $17.75; No. 2, $17.25@$17.50; No. 3, $16.75; No. 4, $16.25; No. 1 soft, $17.75; No. 2 soft, $17.25; gray forge, $16.25.

On the Produce Exchange sales of pig iron warrants have improved a little. The latest quotations are as follows, the first figure being the bid and the second the asked price: March, $16.10—$16.40; April, $16.20—$16.40; May, $16.15—$16.30; June, $16.15—$16.50. The Exchange committee is considering a modification of the contract, which will provide for the sale of foundry and bessemer iron on different bases.

Bars.—Bar iron is higher and a good trade is being done at 1.745@1.845c. for large lots at tidewater. Steel bars are quoted at 1.645@1.745c. Stove trade is active.

Plates.—Plates are in good demand. Tank plates are quoted at 1.645@1.745c., New York delivery; boiler plates, 1.745@ 1.845c. Extra charge is made for extra widths.

Structural Material.—A good deal of new business is under negotiation for local building work. Beams and channels up to 15 in. are quoted at 1.645c. for large lots, and over 15 in. 1.745c. Angles are 1.645c. for large orders.

Steel Rails.—The regular quotation continues $28 per ton at mill for standard sections. Very little business is done in this market. Light rails continue in good demand, prices varying from $23 for 35-lb. sections, up to $28 for 12-lb. rails.

Scrap.—The market is more active. No. 1 railroad wrought is quoted around $20, machinery cast, $14@$15; heavy steel melting scrap is selling around $16.50. These prices are for large lots, f. o. b. terminal points. Scrap delivered brings about $1.50 per ton more.

Philadelphia. Feb. 14.

The pig iron market presents very peculiar characteristics. There is an active demand, even in this bitter cold weather, for foundry grades, and it appears that a good many foundrymen are anxious lest there be another advance, and they will be unable to obtain prompt deliveries when they want the iron. For this reason they are buying wherever they can, and our furnace people are quite willing to accept orders. What affects the crude iron situation is the extraordinary demand for all kinds of iron in all sections of the country. An enormous amount of business has recently been done by Virginia and Alabama furnaces, and this fact is indirectly bearing on the situation here this week. The willingness of furnace people to accept reasonable prices does not have any effect on our people, and they are apprehensive that the next thing they hear will be a general advance of possibly as much as 50c. per ton. Quotations are as follows: No. 1X foundry, $18; No. 2X foundry, $17.50; No. 2 plain, $17; gray forge, $16; basic, $16.50; low phosphorus, $20.25.

Billets.—There is such an extraordinary consumption of crude steel that prices have been advanced as much as $4 per ton in some cases, in the way of a premium, and some of our people have had nothing to do but pay the money. The consumption of steel is increasing, and consumers here feel they are in danger of being pinched. A fair quotation is $26 in a large way, but $27 in a small way is no exception.

Muck Bars.—Muck bars are in demand at $29.50@$30, and business is being offered at those figures.

Bars.—The advances made in the way of premiums do not draw out a single objection, as everybody who needs bar iron knows the situation too well to grunt an objection. They must pay the price or go without. As high as 1.75c. was paid this week for a special make of refined bar.

Sheets.—Sheet of al kinds is wanted just about as fast as our mills can furnish it, and every mill is straining capacity to keep customers in good humor.

Boiler Tubes.—Boiler tube work is very urgent, and we are receiving supplies promptly.

Plates.—A great deal of plate is going to make steel cars, and this leaves what we might call the legitimate trade rather short of supplies. Our local shipyards are again in the market inquiring for early spring deliveries, and they will be taken care of. All kinds of plate and tank, including marine-boiler plate, are very active.

Pittsburg. Feb. 14.

There seems to be more activity in the iron and steel markets this week, although the new business placed was not very heavy. Specifications on old contracts are keeping all the mills in this district going to their full capacity. A great deal of new business at this time of the year is unusual, and the fact that some good orders are being placed is taken as an indication that an active buying movement may be expected at any time. Manufacturers are not trying to encourage buying by offering to shade existing prices, which are being firmly maintained in all finished lines. Advances in several lines are likely to be ordered shortly. During the week the American Sheet & Tin-Plate Co. advanced galvanized sheets $2 a ton, blue annealed sheets $1 a ton, and galvanized corrugated roofing 10c. a square. Black sheets and tin-plate remain unchanged, but an advance in these lines is confidently expected within the next two weeks. The leading producer continues to operate all of its sheet and tin-plate mills, with the exception of the tin-plate plant at Sharon, which was forced to close yesterday by an accident to the machinery; repairs are being made, and it will be going likely before the end of the week. Meetings of the plate and beam pools are scheduled to be held in New York this week, and an advance in plates and structural material would not surprise the trade. The smaller interests are insisting on higher prices in these lines, but it is understood the United States Steel Corporation will strongly oppose any change in prices at this time. The plate mills of the Corporation are filled with orders from steel car-building concerns, and as most of the contracts are based on the selling price of pig iron, it has but little interest in the advancing of prices for plates. In structural material little new business is coming in, but a heavy demand is expected before the close of the first quarter. The mills are busy on orders placed some time ago, and from the amount of new building being figured on, none will be idle for several months; while most of them possibly will be kept in continuous operation to the end of the year. In merchant bar, trade is exceptionally good. A great deal of new business is being placed, particularly in iron bars. The Republic Iron & Steel Co., the leading bar iron interest, is still quoting common iron bars at 1.65c., Youngstown, or 1.69¾c., Pittsburg, but for prompt shipment lately it is said 1.75c. was paid.

The purchase of 25,000 tons of bessemer iron for February shipment by the United States Steel Corporation at $15.50, Valley furnaces, did not have the effect of stiffening prices, so far as known, but this may be attributed to the fact that there is no special demand for iron. There is still some re-sale pig iron in the market, and a lot of 1,600 tons of bessemer was sold this week at $15.25, Valley furnace. It is believed the Corporation will come into the market again, and may buy an additional tonnage for March shipment. Of the January contract, some remained unshipped, but was not cancelled. Southern pig iron is easier, an Ohio interest having closed a contract with a Pittsburg broker for 4,500 tons of Nos. 2, 3 and 4 grades, on a basis of $13.50, Birmingham, for No. 2. The Carnegie Steel Co. during the week put the second Donora and the North Sharon blast furnaces in operation, and has now in blast 50 of its 51 furnaces. J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, has just issued his monthly report on blast furnace conditions. It is as follows: Of 192 furnaces reported to the association, with a daily capacity of 57,389 tons, 167 furnaces were reported in blast. Of this number, 89% are running and 11% are idle, showing normal conditions. The active capacity Jan. 1 was 86%, and that of Feb. 1, 89%, which shows a gain of 3%." It is estimated that on Jan. 1 the country was producing pig iron at the rate of 20,100,000 tons annually. By Feb. 1 the rate had increased to 21,000,000 tons, and since that time some furnaces have been added to the active list, which will in a short time increase the rate to about 22,000,000 tons. The country never produced more than 18,000,000 tons in any calendar year.

Contracts for steel rails are being placed slowly, and up to date not more than 1,000,000 tons have been ordered. The latest contract was placed during the week by the Baltimore & Ohio Railroad. It calls for 48,000 tons, of which the United States Steel Corporation gets 25,000 tons, the Pennsylvania Steel Co. 13,000 tons, and the Cambria Steel Co. 10,000 tons.

Pig Iron.—The market is quiet, and there is no indication of an early advance in prevailing quotations. The purchase of 25,000 tons of bessemer pig iron by the Steel Corporation may be followed by the placing of a contract for a like tonnage for March shipment, and probably at the same price—$15.50, Valley furnace. The only other sale of note was 4,500 tons of southern foundry iron, sold in this market to an Ohio interest, on the basis of $13.50, Birmingham, for No. 2. One re-sale lot of 1,600 tons of bessemer is reported at $15.25, Valley furnace. Quotations for February and future delivery are as follows: Bessemer, $15.50@$16, Valley furnace; foundry No. 2, $16.85@$17.10, Pittsburg; gray forge, $16.10@$16.25, Pittsburg.

Steel.—There is but little doing in billets and sheet-bars, but all sales made are at a premium of from $2 to $3 over the pool price of $21 for billets and $23 for sheet bars. Plates remain firm, at 1.50c., and steel bars at 1.40c.

Sheets.—The leading interest has advanced the price of galvanized sheets $2 a ton, and an advance in black sheets is expected to be ordered before the end of the month. All the mills are busy, and the demand is fairly good. Black sheets, No. 28 gauge, are quoted at 2.30c., and galvanized sheets at 3.45c.

Ferro-Manganese.—There is no change in the market, 80% domestic still being quoted at $46 a ton.

Cartagena, Spain. Jan. 28.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that exports for the week were two cargoes, 4,800 tons dry ore, to Great Britain, and one cargo, 5,150 ore to Great Britain, and one cargo, 5,150 market continues strong, and miners are generally well sold up.

Quotations were as follows, f.o.b. shipping port: Ordinary 50% ore, 6s. 6d. @ 6s. 9d.; low phosphorus, 7s. 2d. @ 7s. 9d.; specular ore, 50%, 9s. 5d. For manganiferous ores quotations vary from 10s. 2d. for 35% iron and 12% manganese, to 14s. 9d. for 20% iron and 20% manganese.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton. No shipments reported for the week.

Chemicals and Minerals.

(See also Prices-Current, page 360.)

NEW YORK, Feb. 15.

The quiet of the market has been intensified by the intervention of the holiday on Monday. Excepting for the natural interference with traffic by the heavy weather, there is little new to be said this week.

There is a bullish feeling in domestic talc of the better quality, consequent upon an unexpected improved demand in the face of small stocks and inability of producers to either enlarge them or ship promptly on contract. As a result holders ask an advance of $1 to $1.50 per ton for prime white mineral, but on the inferior grades, and on the imported, which is in good supply, quotations are unchanged. Momentarily domestic talc is worth $15.50 @$21.50 per short ton, according to quality; French, best, $20; Italian, best, $30. Most of the talc consumed in this country is produced here, while annual imports seldom exceed 2,000 tons.

At last German manufacturers of bromides are to retaliate because of the export of American goods to European markets which was contrary to the agreement that for years has divided the consuming territory. To us there is little surprise at the cut of 50% in prices, and we believe the larger American manufacturers have anticipated the invasion of the German makers. The agents of the German syndicate in the United States quotes, with the proviso that the goods are entirely for local consumption, none to be re-exported, as follows, f.o.b. New York: Potassium bromide, 15c. per lb.; sodium bromide. 17c., and ammonium bromide, 22c. Allowing that the duty is 25% ad val. on potassium bromide, Germany, by reason of its cheap production, is able to compete with Americans. The American consumption has grown, showing a record production of 897,100 lbs. bromine and bromides last year, chiefly in Michigan. At latest accounts a large American producer has met the cut in prices quoted by importers.

An advance of 1.5d. (3c.) for crude iodine in Chile has initiated a change in the schedule of iodine preparations at New York, as follows: Iodine, resublimed, $4.15 @ $4.20 per lb.; ammonium iodide, $4.85 @ $4.90; arsenic iodide, $5.15; bismuth subiodide, $4.80; calcium iodide, $4.30; iron iodide, $3.85; iron iodide syrup, 36c. @ 38c.; lead iodide, $2.80; mercury iodide, green and yellow, 25 lb., $2.75 @ $2.80, and red, $3.00 @ $3.05; potassium iodide, $3.15 @ $3.20; sodium iodide, $3.95 @ $4; sulphur iodide, $4.45.

The American Agricultural Chemical Co. has placed $2,500,000 of its notes, payable three years from March 1, 1905, at 4½% interest, with a Boston banking house. This long-time loan provides for the short-time notes outstanding.

Now comes South Carolina with a proposition to operate a State fertilizer manufacturing plant in competition with the Southern combination. This State is admirably situated—mining locally phosphate rock, and importing at comparatively low cost all other raw materials needed to make a marketable fertilizer. What the Virginia-Carolina Chemical Co. will do to

checkmate this enterprise is awaited with interest.

Included among the imports at New York in 1904 were 199,882 lbs. aluminum sulphate, 355,684 lbs. ammonium carbonate, 258,215 lbs. bitumen, 1,563,648 lbs. barium sulphate, 13,697 tons kaolin, 47,712 lbs. cobalt oxide, 1,985 tons fullers earth, 654,816 lbs. lithophone, 259,305 lbs. mica, 7,669,440 lbs. ocher, 5,199,739 lbs. potassium carbonate, 954,429 lbs. potassium prussiate, 457,774 lbs. sodium chlorate, 192,438 lbs. sodium nitrate, 4,650,932 lbs. talc, and 2,018,405 lbs. zinc oxide.

Copper Sulphate.—Quiet at $5.125@$5.25 per 100 lbs. Imports are still being made; last year New York received 112,527 lbs. from Great Britain.

Acids. The market continues firm, and deliveries are moderate and slow, owing to interrupted traffic by storms.

Nitric acid, 36°, 100 lb.	$5.00
38°, 100 lb.	5.25
40°, 100 lb.	5.50
42°, 100 lb.	5.75
Oxalic acid, com'l, 100 lb.	5.00@ 5.25
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb. in carboys	1.05
60°, bulk ton	18.00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk, ton	21.00@23.00

Sulphur and Pyrite.—Uninteresting momentarily, and prices as last reported. Domestic sulphur 'seconds' stand at $21.45 per ton at New York, while prime is worth $21.75. Deliveries at Baltimore and Philadelphia cost 25c. per ton extra, and to Portland, Me., 15c. Importers quote best unmixed seconds for shipment at $21.25, and thirds from 50 to 75c. less. Domestic pyrite, 42@44% sulphur, is quoted f.o.b. shipping port at 10@10.5c. per unit for lump ore, and 8.5@10c. for fines. On this basis the sulphur contained in the domestic pyrite is worth about $9.66 per ton. Foreign pyrite, 44@52% sulphur, f.o.b. Atlantic ports, is quoted at 10@11.5c. per unit for unwashed lump ore, and 9@10c. for fines. Averaged the sulphur content of imported pyrite is worth about $10.21 per ton, of which $4.50 is the expense for ocean freight. Users of pyrite are paying an average of $9.93 per ton for their sulphur, and allowing for cost of recovery, there remains a handsome profit at the ruling price of brimstone.

Nitrate of Soda.—Expectations are centered in the future market, which has become more hopeful since Germany and France promise to increase their planting of sugar beets this year. In America there is momentarily quiet, but with the approach of spring the situation will likely change for the better. At New York importers quote refined nitrate at $2.325@$2.35 per 100 lbs. for spot and nearby, while arrivals forward to June are worth $2.30@$2.325, and from July to the end of 1906 quotations range down to $2.15, according to position.

Concerning the Chilean market, Messrs. Jackson Bros., of Valparaiso, write under date of January 7, as follows: The market opened very quiet and prices somewhat easier, but on December 28 a certain demand set in for future deliveries, and, aided by producers being short for immediate shipment, caused a rise on previous quotations, transactions taking place for January-February delivery at 7s. 9d.@7s. 10½d. alongside, and for monthly parcels April-December at 7s. 7d.@7s. 8d. alongside. A sale for the whole of the year 1906 was effected at 7s. 2½d. alongside. In refined quality little has been done, 8s. 2d. being paid for April-June delivery, and 8s. 3d. for February. The increase in production for April-December, 1904, as compared with same period of 1903 is estimated as 2,200,000 qtls., while the exports for the same time will probably only show an increase of 700,000 qtls. and the consumption an increase of 940,000 qtls. We quote 95% January, 7s. 10d.; February-March, 7s. 9d.; April-December, 7s. 8½d. The price of 7s. 10d. alongside, with an all-round freight of 18s. 9d., stands in 9s. 8d. per cwt., net cost and freight without purchasing commission.

Messrs. Mortimer & Wisner's statement of nitrate of soda, dated New York, Feb. 1, gives the following interesting statistics, in long tons:

	1904.	1905.
Imported into Atlantic ports from West Coast S. A. in January	27,706	11,700
Stock in store and afloat, Feb. 1, in New York	1,900	300
Boston	700	.....
Philadelphia	125	.....
Baltimore	2,300	.....
Charleston	2,800	700
Savannah	.....	100
Wilmington, N. C.	3,400	.....
To arrive, due May 15, 1905	64,950	68,400
Visible supply to May 15, 1905	76,175	69,500
Stock on hand Jan. 1, 1905	8,100	8,380
Deliveries past month	24,851	18,980
Total yearly deliveries	239,684	.....
Prices current, Feb. 1	2.17½c	2.35c.

Quotations are for 96%; 95% can be had at 2½@5c. per 100 lbs. cheaper.

Sulphate of Ammonia.—Now that most of the urgent orders for domestic gas liquor have been placed at good prices, and the foreign situation fully appreciated, judging by reports of speculators, the market has again quieted down. Domestic is quoted at $3.175@$3.225 per 100 lbs., and foreign, $3.275@$3.325, according to time of delivery.

Phosphates.—Statistically the industry is in a good position, and there are signs that exports this year will show an increase, especially to Germany. Last month there was shipped through Savannah alone 18,591 tons Florida high-grade rock, the largest monthly amount in a long while.

Acid phosphate is in good demand, and at New York 60c. per unit in bulk is the basis price for 14@16% quality.

Reports from abroad indicate a smaller production of basic slag this year, especially in Germany, where the coal strike has inconvenienced the iron masters. Many foreign countries depend upon Germany for their basic slag for fertilizer. In the 10 months ending October 31, 1904, Germany exported 22,340 metric tons, principally to Austria-Hungary, Holland, Belgium and Italy. In the corresponding period of 1903 the exports were 18,869 tons, or 3,471 tons less than 1904. Germany imported in the 10 months of 1904 a total of 13,095 tons, against 11,463 tons in 1903, mostly from Belgium and France. In European markets basic slag containing 30@35% phosphoric acid, is quoted at the equivalent of $7.78@$8.03 per ton; 38@45%, $9.48@$9.84; 42@50%, $14.60@$17.13 per ton, delivered.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$11.45@11.65
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.00@4.25	10.27@10.67
78%	3.75@4.00	.....
75%	3.25@3.50	.....
‡So. Car. land rock	3.25@3.50	.....
river rock	3.00@3.25	6.38@ 6.67
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr	.....	11.39

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant ‡ On vessel Ashley River, S. C.

Liverpool. Feb. 1.

Messrs. Joseph P. Brunner & Co. report that while the market is steady generally, there is no pronounced activity in the export demand.

Soda ash is in fair request. For tierces, nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in moderate request at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda receives a fair amount of attention from buyers and supplies are not over plentiful, while quotations are firm as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special terms for the Continent and a few other export quarters.

Bleaching powder is dull as regards export business at £4 5s.@£5 per ton, net cash for hardwood, as to market.

Nitrate of soda is moving off fairly well on spot at £11 10s. per ton for ordinary, up to £11 15s. per ton for refined, in double bags f.o.b. here, less 2½ per cent.

Metal Market.

New York, Feb. 15

Gold and Silver Exports and Imports.

At all United States Ports in December and year

Metal	December.		Year.	
G'ld	1903.	1904.	1903.	1904.
Exp	$1,414,656	$13,429,415	$44,346,834	$121,138,415
Imp	17,230,298	3,336,184	65,267,696	84,803,234
Exc	I.$15,765,642	I.$10,093,231	I.$20,920,862	E$36,335,181
Silv				
Exp	6,515,653	4,292,161	40,610,342	50,312,745
Imp	2,078,655	2,252,955	23,974,508	26,087,042
Exc	E.$4,436,998	E. $2,039,206	E$16,635,834	E$24,225,703

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending February 11 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$3,648,982	$63,412	$624,980	$41,130
1905	27,546,865	413,297	4,105,083	119,798
1904	1,027,597	1,227,185	5,675,906	160,736
1903	37,303	646,592	2,053,632	118,304

Gold exports were principally to France and Argentina; imports from Central America and the West Indies. Silver exports were chiefly to London; imports from Central America.

General business continues in good condition, though some interruptions have been caused by severe weather. Gold continues to go out, though in smaller amounts.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending February 12, gives the following totals, comparisons being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts	$999,569,900	$1,142,106,100
Deposits	1,026,357,500	1,202,972,300
Circulation	40,737,100	43,025,100
Specie	205,647,500	222,571,000
Legal tenders	71,321,100	89,209,000
Total reserve	$276,968,600	$311,780,000
Legal requirements	256,589,375	300,743,075
Balance surplus	$20,379,225	$11,036,925

Changes for the week this year were increases of $14,019,300 in loans and discounts, $5,992,000 in deposits, and $126,400 in circulation; decreases of $4,742,500 in specie, $2,564,500 in legal tenders, and $8,805,000 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
N. Y. Ass'd	$222,571,000	.....
England	179,533,890	.....
France	551,241,300	$220,607,250
Germany	201,165,000	67,055,000
Spain	74,830,000	100,715,000
Netherlands	29,192,500	31,189,500
Belgium	16,226,665	8,138,335
Italy	111,690,000	16,020,000
Russia	515,280,000	30,930,000
Austria	242,005,000	62,685,000

The returns of the Associated Banks of New York are of date February 11, and the others February 9, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Under moderate inquiry for Indian government account silver has maintained a tolerably steady position. There are no new features, however, to report.

The United States Assay Office in New York reports receipts at 43,000 oz. of silver during the week.

Shipments of silver from London to the East for the year up to January 24 are reported by Messrs Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India	£1,692,989	£38,103 D.	£1,654,886
Straits	777,500	2,800 D.	774,700
Totals	£2 470 489	£40 903 D.	£2 429 586

Receipts for the week this year were £233,000 in bar silver from New York and £15,000 from Australia; total, £248,000. Shipments were £247,550 in bar silver to Bombay and £20,000 to Calcutta; total, £267,550.

The movement of gold in France for the full year is reported as follows:

	1903.	1904.
Imports	Fr.314,259,000	Fr.656,063,000
Exports	129,890,000	123,976,000
Excess, imports	Fr.184,369,000	Fr.532,087,000

France continued to accumulate gold throughout the year, imports having been very large. Of the imports last year, 98,540,000 fr. were in coin, and 557,523,000 in bullion.

The movement of silver in France for the full year was as follows:

	1903.	1904.
Imports	Fr.127,057,000	Fr.97,067,000
Exports	97,377,000	126,310,000
Excess	Imp.29,680,000	Exp.29,243,000

Imports of nickel and copper coins, rated at their face value, were 106,000 fr. in 1903 and 183,000 fr. in 1904. Exports of such coins were 849,000 fr. in 1903 and 435,000 fr. last year.

The coinage at the mints of the United States in January, is reported by the Bureau of the Mint, Treasury Department, as below:

Denomination.	Pieces.	Value.
Double eagles	364,000	$7,280,000.00
Half eagles	39,170	195,850.00
Quarter eagles	137,280	345,200.00
Total gold	540,450	$7,819,050.000
Dollars	86,000	43,000.00
Quarter dollars	1,436,000	359,000.00
Dimes	2,700,122	279,012,20
Total silver	4,312,122	$681,012.20
Five cents (nickels)	1,160,000	58,000.00
One cent (bronze)	2,029,000	20,290.00
Total minor	3,189,000	$78,290.00
Total coinage	8,041,572	$8,578.352.20

In addition to the above, there were coined for the Philippines, 1,056,000 pesos, 30,000 20c., and 4,300,000 1c., making a total of 5,386,000 pieces.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.47½	$0.49½
Peruvian soles and Chilean pesos	.43½	.46
Victoria sovereigns	4.85½	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	.82

Other Metals.

Daily Prices of Metals in New York.

	Copper.			Tin.	Lead.	Spelter	
February.	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
9	15 @15¼	14¾ @15¼	67½	29½	4.45	6.10 @6.15	5.95 @6.00
10	15 @15¼	14¾ @15¼	67½	29½	4.45	6.10 @6.15	5.95 @6.00
11	15 @15¼	14¾ @15¼	....	29½	4.45	6.10 @6.15	5.95 @6.00
13	.....	.....	67¾	.....	.....	.....	.....
14	15 @15¼	14¾ @15¼	67¾	29½	4.45	6.10 @6.15	5.95 @6.00
15	15 @15¼	14¾ @15¼	68	29½	4.45	6.10 @6.15	5.95 @6.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

February.	Sterling Exchange.	Silver. New York. Cents.	Silver. London. Pence.	February.	Sterling Exchange.	Silver. New York. Cents.	Silver. London. Pence.
9	4.87¼	61½	28 3/16	13	.....	.....	28½
10	4.87¼	61½	28½	14	4.87¼	61	28 1/16
11	4.87¼	61½	28½	15	4.87¼	61¼	28 1/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Copper.—The baneful conditions about which we reported last week continue to exercise a quieting influence on the market. If it had not been for the fact that there is but very little copper unsold in the hands of producers and dealers, a decline could hardly have been avoided. As it is, prices remain steady and firm, which is a most striking proof of the extraordinary inherent strength of the copper market. The feeling in Europe is now again improving, and there are signs of a re-awakening of demand, both for export and home trade, which before long is bound to exercise an influence on prices. This week's closing quotations are unchanged, at 15@15¼ for Lake copper; 14⅞@15⅛ for electrolytic, in ingots, cakes and wirebars, 14⅝@14⅞ in cathodes; 14½@14¾ for casting copper.

The market for standard copper in London has fluctuated within narrow limits, but the tone at the close is somewhat firmer, the quotations being cabled as £68 for spot, £68 2s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £70@£70 10s.; best selected, £70 15s.@£71 5s.; strong sheets, £78 10s.@£79 10s.; India sheets, £75 10s.@£76 10s.; yellow metal, 6⅝@6¾d.

Exports of copper from New York and Baltimore for the week of February 14 were 966 tons, also $200 worth of ore. Imports for the week of February 10 were 558 tons copper, and $66,775 worth of ore, quantity not given.

Tin.—The additional arrivals have not been of sufficiently large volume to do away with the premium on spot tin, or, rather, it appears that most of the tin which has come in is already sold. The demand is satisfactory and prices are well maintained. Quotations at the close are unchanged, at 29½c. for spot, 29c. for futures.

The foreign market, which closed last week at £131 10s. for spot, £130 for three months, opened on Monday somewhat easier, at £131 5s. for spot, but there has again been a recovery, and the closing quotations on Wednesday are cabled as £132 10s. for spot, £131 for three months.

Lead.—With the approach of the warmer season the demand shows signs of improvement, and there is a steady inquiry at current prices. Quotations are unchanged, at 4.37½, St. Louis, 4.45, New York.

The foreign market is again somewhat lower, and closes at £12 7s. 6d. for Spanish lead, £12 10s. for English lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 28, that silver has been 14.50 reales per oz. Pig lead is quoted at 70.25 reales per quintal, which, on current exchange of 33.14 pesetas to £1, is equal to £11 17s. 4d. per long ton f.o.b. Cartagena. Exports for the week were 338 tons of argentiferous lead, 64 tons desilverized, and 1,230 kg. bar silver, all to Marseilles.

Spelter.—The demand has been rather slow, as the larger galvanizers are well supplied, but consumption continues in very satisfactory volume. The closing quotations are 6.10@6.15, New York, 5.95@6c., St. Louis.

The foreign market is somewhat higher, at £24 15s. for good ordinaries, £24 17s. 6d. for specials.

Silesian Spelter Market.—Herr Paul Speier writes from Breslau, Germany, under date of January 31, that the market remains very strong. Both speculators and consumers are active buyers. The price continues high, the current quotation for ordinary brands being 25 marks per 50 kg. f.o.b. cars at Breslau. This is equivalent to 5.4c. per lb. The production of the Silesian works in 1904 was 125,646 tons, which is an increase of 7,114 tons over 1903. Zinc sheets continue in strong demand. Zinc dust was sold moderately, while the price in large lots is 44.50@44.75 marks per 100 kg., f.o.b. Stettin.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 28, that there has been no change in the market, demand continuing good. Prices remain at 75 fr. per ton for blende, 35% zinc, and 54 fr. for calamine, 30% zinc.

Antimony is unchanged. We quote Cookson's at 8¼@8½; Hallett's, 8@8¼; Hungarian, U. S., French, Italian, Japanese and Chinese, 8@8⅛ per pound.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots is higher, according to quantity, running up to 60c. for small orders.

Platinum.—Quotations are firm at $19.50 per ounce.

Platinum in manufactured forms is strong. Messrs Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, $1 per gram.

Quicksilver.—Quicksilver continues quiet but steady, at $40 per flask in large lots, while $41.50 is the price for smaller orders. San Francisco prices are lower, $37.50@$39 per flask being quoted for do-

mestic orders, with some discount for export. The London price is £7 12s. 6d., with the same figures quoted by second hands.

Cadmium.—Metallic cadmium, guaranteed 99.5%, is selling in quantities of 100 kgs. or over at 710 marks per 100 kgs., packing included, f.o.b. Hamburg. This is equivalent to 76.6c. per lb. Prices are for net cash.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg. f.o.b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f.o.b. Bremen.

For other minor metals and their alloys, wholesale prices are f.o.b. works:

	Per lb.
Aluminum.	
No. 1, 99% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	$1.00
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	45c.
Magnesium, pure (N. Y.)	$1.60
Manganese, (98@99% N. Y.)	75c.
Manganese Cu., (30@70% N. Y.)	40c.
Molybdenum, (98@99% N. Y.)	$2.75
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best)	$1.25

Missouri Ore Market.

JOPLIN, Feb. 11.

The highest price reported paid for zinc was $56.50 per ton, $1.50 per ton less than a week ago. The assay basis dropped during the week until the highest offerings at the close were $52 per ton of 60% zinc. Several carloads were reported sold today at this price, for early delivery next week. Weather indications are practically unchanged, the earth being covered with over a foot of snow and more falling, a condition that makes against mining operations and the loading of the ore on to cars. The restricted output has been met with a limited demand on the part of the smelters, who have shipped each week just about what was produced. This reduction in purchases leaves some of the smelters close up on their stocks at the works, a fact that is preventing any sharp decline in prices, notwithstanding that zinc ore is selling at prices out of all proportion to spelter prices. Lead prices were advanced during the week by the agent of the St. Louis Smelting & Refining Co. $1 per ton, to $58. The Galena smelter met the advance, but the Granby Mining & Smelting Co. and the Picher Lead Co. restricted their offerings to $57 per ton.

Following are the shipments of zinc and lead ore from the various camps of the district for the week ending to-day:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,510,840	119,740	$71,200
Carterville and Webb City	1,334,100	222,400	41,140
Duenweg	470,080	.....	12,690
Alba	367,960	.....	10,300
Aurora	392,000	.....	8,880
Prosperity	279,720	.....	7,830
Spurgeon	219,430	6,500	4,510
Galena-Empire	148,700	.....	3,860
Oronogo	123,680	.....	3,300
Carthage	104,330	.....	2,920
Badger	101,860	.....	2,850
Granby	118,000	30,000	2,370
Neck City	42,590	.....	1,190
Zincite	31,550	.....	850
Totals this week	6,244,840	378,640	$173,890
Six weeks	43,248,620	4,692,210	$1,263,560

Zinc value, the week, $162,980; six weeks, $1,123,700. Lead value, the week, $10,910; six weeks, $139,860.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905
January	57.055	60.690	26.423	27.930
February	57.592	.....	26.665	.....
March	56.741	.....	26.164	.....
April	54.202	.....	24.974	.....
May	55.430	.....	25.578	.....
June	55.673	.....	25.644	.....
July	58.095	.....	26.760	.....
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

COPPER IN NEW YORK.

Month.	Electrolytic.		Lake.	
	1904	1905.	1904.	1905.
January	12.410	15.008	12.553	15.128
February	12.063	.....	12.245	.....
March	12.299	.....	12.551	.....
April	12.923	.....	13.120	.....
May	12.758	.....	13.000	.....
June	12.269	.....	12.399	.....
July	12.380	.....	12.505	.....
August	12.343	.....	12.468	.....
September	12.495	.....	12.620	.....
October	12.993	.....	13.118	.....
November	14.284	.....	14.456	.....
December	14.661	.....	14.849	.....
Year	12.823	.....	12.990	.....

Prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower.

COPPER IN LONDON.

Month.	1904.	1905.	Month.	1904.	1905
Jan.	57.500	68.262	July.	57.256	.....
Feb.	56.500	.....	August	56.952	.....
March	57.321	.....	Sept.	57.645	.....
April	58.247	.....	Oct.	60.012	.....
May	57.321	.....	Nov.	65.085	.....
June	56.398	.....	Dec.	66.384	.....
			Av., year	58.857	.....

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905
Jan.	28.845	29.325	July.	26.573	.....
Feb.	28.087	.....	August	27.012	.....
March	28.317	.....	Sept.	27.780	.....
April	28.132	.....	Oct.	28.596	.....
May	27.718	.....	Nov.	29.185	.....
June	26.325	.....	Dec.	29.286	.....
			Av., year	27.986	.....

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July.	4.192	.....
Feb.	4.375	.....	August	4.111	.....
March	4.475	.....	Sept.	4.200	.....
April	4.475	.....	Oct.	4.200	.....
May	4.23	.....	Nov.	4.200	.....
June	4.496	.....	Dec.	4.600	.....
			Av., year	4.309	.....

SPELTER.

Month.	New York.		St. Louis.	
	1904.	1905.	1904.	1905.
January	4.863	6.190	4.673	6.032
February	4.916	.....	4.717	.....
March	5.057	.....	4.841	.....
April	5.219	.....	5.038	.....
May	5.031	.....	4.853	.....
June	4.760	.....	4.596	.....
July	4.873	.....	4.723	.....
August	4.866	.....	4.716	.....
September	5.046	.....	4.896	.....
October	5.181	.....	5.033	.....
November	5.513	.....	5.363	.....
December	5.872	.....	5.720	.....
Year	5.100	.....	4.931	.....

Dividends.

Company.	Payable.	Rate.	Amount.
†Amalgamated Copper	Feb. 27	$0.50	$765,439
Amalgamated, extra	Feb. 27	.50	765,439
American Coal	Mar. 1	1.25	62,500
‡Associated Oil, Cal.	Feb. 1	.01½	315,000
Atlantic Copper	Feb. 15	.50	50,000
Arizona Copper, def. ord	Feb. 23	1.83	115,468
Arizona Copper, pf. ord	Feb. 23	1.82	575,757
*Bunker Hill & Sullivan	Feb. 4	.25	75,000
Cambria Steel	Feb. 15	.75	675,000
†Camp Bird, Col.	Feb. 4	.18	147,600
*Caribou Oil, Cal.	Feb. 16	.07	5,600
*Central Eureka Cal.	Feb. 11	.07	28,000
*Central Lead, Mo.	Feb. 28	.50	5,000
Claremont Oil, Cal.	Feb. 1	.01	4,500
†Colo. & Hocking C. & I.	Feb. 15	.25	17,311
Esperanza, Mex.	Feb. 11	.12	54,600
*Four Oil, Cal.	Feb 15	.01	3,000
Gold King Con., Col	Feb. 15	.01	9,369
Greene Con. Copper	Feb. 20	.40	345,600
*Homestake, S. D.	Feb. 25	.25	54,600
Iron Silver, Col.	Mar. 4	.10	50,000
*Imperial Oil, Cal.	Feb. 6	.20	20,000
Jeff. & Clearf., c., pf	Feb. 15	2.50	37,500
*Lightner, Cal.	Feb. 20	.05	5,113
†National Carbon, pf.	Feb. 15	1.75	78,750
*New Century Zinc & Lead	Feb. 1	.01	1,500
*N. Y. & Hond. Rosario	Feb. 25	.40	15,000
*Oil City Petroleum, Cal.	Feb. 1	.00½	2,500
Parrot, Mont.	Mar. 13	.50	114,925
*Peerless Oil, Cal	Feb. 1	.14	12,880
*Penna. Con., Cal.	Feb. 15	.10	5,150
*Peñoles, Mex.	Feb. 15	23.75	59,375
†Phila. Gas, com.	Feb. 1	.75	398,888
Phila. Gas, pf	Mar. 1	1.25	143,620
*Pocahontas Coll., pf.	Feb. 1	.50	7,500
Quincy, Mich.	Feb. 26	3.00	300,000
*San Rafael.	Feb. 20	13.30	15,960
*San Rafael, aviado.	Feb. 20	5.30	6,360
*Soledad, Mex.	Feb. 20	7.13	6,840
*Sorpressa, Mex	Feb. 20	2.38	2,280
*Silver King, Utah.	Feb. 10	.66⅔	100,000
†Tenn. C. & I., pf	Feb. 1	2.00	4,960
*Thirty-three Oil	Feb. 6	.10	10,000
*Twenty-eight Oil, Cal.	Feb. 1	.15	9,000
†U. S. Steel, pf	Feb. 28	1.75	6,304,919
*Union Oil, Cal.	Feb. 15	.50	26,336
United States, Utah.	Feb. 15	.50	210,000

*Monthly. †Quarterly. ‡Semi-Annual.

Assessments.

Company.	Delinq.	Sale.	Amt.
Andes, Nev.	Jan. 26	Feb. 17	$0.10
Belcher, Nev.	Mar. 15	.....	.10
Big Casino, Cal	Feb. 18	.....	.03
Blue Eagle, Utah	Mar. 4	Mar. 25	.00½
Bunker Hill, Cal	Mar. 1	.....	.05
Burlington, Utah	Feb. 15	Mar. 15	.00½
Caledonia, Nev.	Feb. 15	Mar. 8	.10
Columbus Con., Utah.	Feb. 11	Mar. 6	.20
Con. Cal. & Va., Nev	Feb. 7	Feb. 28	.25
Dagmar Northwest, Utah	Feb. 15	Mar. 10	.00½
Gould & Curry, Nev.	Feb. 24	Mar. 15	.10
Hale & Norcross, Nev	Mar. 7	.....	.10
Hardscrabble, Utah.	Jan. 31	Feb. 28	.00½
Highland Boy Con., Utah.	Feb. 4	Feb. 23	.00½
Jackson Butte, Cal.	Mar. 16	.....	.02
La Palma, Mex.	Mar. 6	.....	.04
Mayday, Cal	Jan. 24	Mar. 7	.03
Mayflower, Utah	Mar. 9	Mar. 25	.00½
Patterson Creek, Cal	Feb. 20	.....	.10
Petro, Utah.	Feb. 18	Mar. 11	.03
Planetary, Utah	Jan. 23	Feb. 23	.01
Potosi, Nev.	Feb. 21	Mar. 15	.10
Seg. Belch. & Mides	Feb. 7	Feb. 27	.05
Sheba, Utah	Feb. 15	Mar. 10	.03
Torbanehill, Utah	Jan. 31	Feb. 20	.00½
Union Con., Nev.	Feb. 24	Mar. 16	.15
West Century, Utah.	Feb. 20	Mar. 10	.00½
Yellow Jacket, Nev	Jan. 11	Feb. 16	.10

Salt Lake City. Feb. 10

Company.	Par Val	High.	Low.	Shares.
Ajax	$1	.11½	.10½	5,000
Beck-Tunnel		.07	.06½	1,550
Butler-Liberal	1	.12½	.....	2,500
Carisa		.10	.10	1,200
Con. Mercur		.36½	.36	800
Daly	20	2.60	2.50	3,650
Daly-West	20	15.25	14.87½	15
Ingot	¼	.02½	.02½	5,300
Little Chief	1	.02	.02	8,000
Lo Mammoth	1	.15	.14	2,800
May Day	25	.08½	.08	22,572
Mammoth	1	1.23	1.23	100
Naildriver	1	.45	.44	800
New York	1	.51	.48	21,840
Ontario		4.00	4.00	200
Petro	1	.10	.08½	1,500
Sacramento		.10	.10	300
Silver Shield	1	.....	.....	10,000
Star Consolidated	1	.14½	.13	5,200
Tetro	1	.19½	.19½	500
Uncle Sam Consolidated	1	.27	.23	16,190
Victor Con	1	.04	.03⅞	3,200
Victoria	1	1.90	1.85	200
Yankee Consolidated	1	.34	.33½	1,600

Total sales 115,017 shares.

STOCK QUOTATIONS.

Colorado Springs (By Telegraph).

Company	Feb. 13* H.	Feb. 13* L.	Feb. 14 H.	Feb. 14 L
Anaconda			.20½	.20¼
C. K. & N.			.22	.19
Cripple Ck. Con.			.12¾	.12
Doctor Jack Pot			.03¾	.03½
Elkton Con.			.69½	.69⅜
El Paso.				
Isabella.			.34½	.34⅜
Moon Anchor.			.07¼	.06½
Old Gold.			.09	.07¼
Portland.			1.87	1.85
Vindicator Con.			.86	.80
Work			.15½	.15⅜

*Holiday

Ishpeming, Mich.* Feb. 11.

Company.	Par Val.	H.	L.
Black Mountain	$1	$2.30	$2.25
Calumet & Arizona.	10	108¼.00	105.00
Calumet & Pittsburg	10	50.00	45.50
Junction Development	10	108.00	106.00
Lake Superior & Pittsburg	10	52.50	51.50
Pittsburg & Duluth (full paid)	15	29.75	27.50

*By The Wallace H. Hopkins Co.

St. Louis, Mo.*

Company.	Par Val.	Bid.	Ask.
Am. Nettie, Colo.	$10	$0.15	$0.20
Center Creek.	10	1.40	1.75
Central Coal & C.	100	61.50	63.00
Central C & C., Pf.	100	72.00	74.00
Central Lead, Mo.	100	120.00	125.00
Columbia Lead Mo.	10	.25	1.90
Con. Coal, Ill	100	11.00	15.00
Doe Run Lead, Mo.	100	115.00	120.00
Granite Bimet. Mont.	10	.35	.40
St. Joe Lead, Mo.	10	16.00	17.50

*By our Special Correspondent.

Montreal.* Feb. 11

Company	Par Val.	High.	Low.	Sales.
Dominion Coal.	100	66.75	66.50	60
Dominion Coal, Pf.	100			
Dom. I. & St.	100	18.25		15
Dom. I. & St., Pf.	100	63 50		25
Montreal Steel	100	79.50		3
Montreal Steel, Pf	100	108.50	107.50	55
Nova Scotia St.	100	67.50		50
N. S. Steel, Pf.	100			

*Montreal Stock Exchange.
Total sales, 208 shares.

San Francisco.* Feb. 2

Company.	Location.	Opening. H.	Opening. L.	Closing. H.	Closing. L.	Sales.
MacNamara.	Nev.	.71	.59	.66	.60	51,600
Mont. Tonopah	Nev.	242½	2.40	3.00	2.85	19,600
Ton. Belmont	Nev.	.85	....	.91	87	8,100
Ton. Midway	Nev.	.91	.90	.99	.98	10,300
Ton. Mg. Co.	Nev.					
Ton. North Star	Nev.	.37	.36	.45	.44	77,700

*San Francisco & Tonopah Exchange.
Total sales, 167.300 shares.

San Francisco (By Telegraph).

Company.	February 13*	February 14
Belcher		.18
Best & Belcher.		1.10
Caledonia		.63
Challenge Con.		.25
Chollar.		.23
Confidence		.86
Con. California & Virginia.		2 05
Crown Point.		.15
Gould & Curry		.18
Hale & Norcross.		1.55
Mexican.		2.10
Ophir		7.37½
Overman		.22
Sierra Nevada.		.36
Union Con.		.60
Yellow Jacket.		.22

*Holiday.

New York.

Company.	Par Val.	Feb. 8 H.	Feb. 8 L.	Feb. 9 H.	Feb. 9 L.	Feb. 10 H.	Feb. 10 L.	Feb. 11 H.	Feb. 11 L.	Feb. 13* H.	Feb. 13* L.	Feb. 14 H.	Feb. 14 L.	Sales
Alice	25	1.10	1.05											200
Amalgamated	100	74¾	73½	74¼	73½	74¾	73⅝	74½	73¾			74⅝	73¼	131,480
Anaconda	25	106½	105½	106	105½	107½	106½	107½	107			106½	106	2,650
Best & Belcher	3													
Breece	25					.35								100
Brunswick	1	.08						.08				.07		3,700
Caledonia	1					.62								100
Chollar	2½													
Confidence	3	.95				.90								500
Con. Cal. & Va.	2½			2.15	2.10	2.20		2.20				2.20	2.15	1,100
Daly	20	2.40												300
Elkton Con.	1	.73	.72					.71	.70					700
Federal Mining and Smelting	100	75½	72	85	76	90½	89½	95	90			93	90½	5,606
Preferred	100	85½	84½	88	85½	90½	88½	90½	90½			93½	90⅜	32,741
Gould & Curry	1													
Greene Consolidated Copper	10	26⅜	26½	26⅜	26	26½	26	26⅜	26½			26⅞	26⅜	9,300
Greene Consolidated Gold	10	6½	6½	7		7		7				7	6½	5,550
Hale & Norcross	3			1.40										100
Homestake	100	73												100
Horn Silver	20			1.60										50
Iron Silver	20			2.00										33
Isabella.	1			35				.36	.35					2,000
Mexican	3	2.25												200
Mollie Gibson.	5							.06						200
Occidental	3							.85						100
Ontario	100	3.85												50
Ophir	37	7.25		7.00		7.25						7.50		400
Overman	2	.30												200
Phoenix	1					.10								1,000
Portland	1													
Potosi.	1											.13		300
Quicksilver	100	4.25												100
Quicksilver, pf.	100													
Savage	3							.40				.41	.40	800
Sierra Nevada	3							.43	.42					400
Silver Hill.	1													
Small Hopes	20													
Standard Con	10	1.85												100
Tennessee Copper Common	25	32		33	32	32		32						1,100
Union Consolidated	1	.66												200
United Copper.	100					8						8		600
Yellow Jacket	3			25										300

*Holiday. †Ex-dividend. Total sales, 202,360 shares.

Boston.

Company.	Par Val.	Feb. 8 H.	Feb. 8 L.	Feb. 9 H.	Feb. 9 L.	Feb 10. H.	Feb 10. L.	Feb. 11 H.	Feb. 11 L.	Feb. 13* H.	Feb. 13* L.	Feb. 14 H.	Feb. 14 L.	Sales.
Adventure Con	$25	‡7	6½	6⅞		7½	6¾					7		700
Allouez.	25	20	19½	19½	19½	20½	20	20½	20			20½	20½	2,725
Amalgamated	100	74⅜	73½	74	73½	74½	73⅜	74½	73⅜			74⅜	74	11,999
Am. Z. L. & Sm.	25			11¼	11	11								290
Anaconda	25													
Arcadian	25		1½		1½	1½						1½		250
Arnold	25													
Ash Bed	25											35		200
Atlantic	25	17	16½	16⅞				16⅜	16½			16⅞		195
Bingham Con.	50			32½	32⅛	32⅜	32½	32½				32½	32½	295
Boston Con.	10	7	6¾	6⅞	6½	6⅝		7				7¼	7	5,656
Boston Quicksilver	5	.25												50
Calumet & Hecla.	25	680	676	680		680	675½	680				680	675	74
Centennial	25	18	17½	18	17	18½	18¼	19½	18½			19⅛	19½	2,990
Con. Mercur.	5			.40		39	.38					.40	.38	1,248
Continental Zinc	25													
Copper Range	100	69		69	67⅞	68½	67½	69¼	68½			69½	69¼	2,389
Crescent.	10													
Daly-West.	20	15½		15½		15½		16	15½			16		183
Elm River	12			2¼				2¼						110
Franklin.	25	10½		10¼		10⅜	10¼					11		323
Granby Con.	10	5½	5	5⅜		5⅜	5⅜	5⅛	5			5⅛		4,450
Greene Con	10	27	26⅞	26½	26	26⅞	26⅜	26½	26½			26⅞	26½	6,197
Guanjuato Con.	10	4	3 1/16	4	3 1/16	4⅛	3 1/16	4	3⅞			4⅛	3 1/16	3,485
Humboldt	25													
Isle Royale Con.	25	25½	25½	25⅝	25½	25½	24⅛	24⅛	24⅛			25½	24½	1,164
Mass Con	25	11⅞	11⅜	11½	11	12½	11½	12⅛	12			12⅛	11⅞	11,452
Mayflower	25													
Michigan	25	13	12	12½		13	12½	13				13		1,030
Mohawk.	25	52½	52	52⅞	51½	52						52⅛	52½	349
Montana Coal & Coke.	25			4⅝		4½						4⅜	4½	1,005
National.	25													
New Idria	5													
Old Colony.	25											1		5
Old Dominion	25	26⅜	26½	26½		26½		26½	26½			27		640
Osceola.	25	93½		92	88	92½	90½	92				92	91½	2,438
Parrot	10											28⅜	28	25
Phoenix Con.	25			2½								2¼		95
Quincy	25	110	107	107		107	106½	107						150
Rhode Island.	25			2		2¼		2¼				2¼	2	350
Santa Fe.	10							2¼				2¼		110
Shannon.	10	7½	6¾	7	6¾	7⅛	7	7⅛	7			7⅛	7	3,192
Tamarack	25	132		130		132	130½					132	130	92
Tecumseh	25	2¼												20
Tennessee	25													
Trinity	25	10⅞	9½	10⅛	10	11⅛	10⅛	11⅛	11			11⅛	10⅞	21,272
Union Cop. L'd. & Mg.	25							3						200
United States	25	23½	23½	23½		23¼	23	24	23½			24	23¼	6,735
U. S. Coal & Oil.	25	10	9¼	9⅞		10		10	9¼					900
Utah Con.	5	42	41½	41⅞	41½	42⅛	41½	41⅞	41½			41⅜	41½	2,185
Victoria	25			4 1/32	4½	5	4½	5	4½			5		555
Winona	25	12		11½				11½				12		370
Wolverine	25	113½	111½	113	112½	112½	111½	112½	112			113	112½	851
Wyandot	25			2		1⅛						2⅛	1½	306

*Holiday. ‡Assessment paid. Total sales, 99 260 shares.

STOCK QUOTATIONS.

Coal, Iron and Industrial Shares.

Company.	Par Val.	Feb. 8		Feb. 9		Feb. 10		Feb. 11		Feb. 13‡		Feb. 14		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allis-Chalmers	$100	16½	15¾	16¼	16	16¾	16	16½	...	...	...	16¾	16½	4,600
Preferred	100	64	...	65	64	...	...	65	64	...	...	65	...	2,000
Am. Agri. Chem.	100	22½	22	...	...	22½	...	...	...	...	...	...	...	1,175
Preferred	100	90	...	90½	...	...	...	...	...	...	...	...	...	210
Am. Sm. & Ref.	100	87¼	86½	87⅝	86⅜	86⅜	86¼	86½	85⅞	...	...	86	85⅝	33,330
Preferred	100	118½	118¼	...	...	118⅜	118¼	118¼	...	...	...	118	117½	6,475
†Cambria Iron	50	...	...	...	...	...	...	49	...	...	...	49	...	55
†Cambria Steel	50	26	25½	25⅜	...	26	25⅜	26¼	25⅜	...	...	26⅛	26	13.198
Col. Fuel & Iron.	100	49	47¾	48¼	47½	49⅜	47¼	52	49⅛	...	...	52⅜	50¼	74,310
Col. Fuel & Iron pf	100	...	...	...	...	95½	85	...	...	...	...	...	...	400
Col. & H. C. & I	100	17	16½	16⅛	16	16⅝	16	16½	...	...	...	16½	...	1.800
General Chem.	100	...	...	...	...	...	...	...	...	...	...	...	...	.....
General Chem. pf	100	...	...	...	...	...	...	...	...	...	...	...	...	.....
†Lehigh Nav.	50	110½	109	110	109½	110½	110	110⅛	...	...	...	110⅛	...	2,649
*Mong. R. Coal	100	10	...	...	...	...	...	...	...	...	...	...	...	88
*Mong. R. Coal pf.	100	...	...	...	...	28½	...	...	...	...	...	28½	...	120
National Lead	100	31⅞	31½	31⅝	31	32⅛	31½	32	31⅜	...	...	32⅛	31⅞	26,500
Preferred	100	102	...	...	...	102½	...	...	...	...	...	...	...	210
Phila. Nat. Gas	50	42½	42	42½	42	42½	42	43	42½	...	...	43	42⅜	12,847
Preferred	50	47½	...	48	47½	...	...	47	46⅞	...	...	47	46⅞	1.012
Pittsburg Coal	100	21½	21⅜	21	...	21½	21⅛	...	...	...	...	21½	21	2,771
Preferred	100	79⅝	79	79⅞	79⅜	80½	79½	80½	79½	...	...	80	79⅝	4,108
Republic I. & S.	100	16⅝	16⅜	17	16⅜	18½	16½	18⅜	18	...	...	18½	17⅞	56,150
Preferred	100	71¼	71	71¼	70¼	76	71	76¾	74¼	...	...	76½	75½	68,450
Sloss Shef. S. & I.	100	64½	63½	65½	64½	66⅜	65	67	66¼	...	...	69	67½	17,400
Preferred	100	...	...	...	...	...	...	104½	...	...	...	106½	105¼	1,100
Standard Oil.	100	651	647½	649	648	648	646	645½	...	...	...	650	646	70
Tenn. C. I. & R. R.	100	77⅞	75⅝	77½	76½	81⅞	76⅜	82⅜	80¼	...	...	82	78¾	226,450
U. S. Steel Corp	100	31⅛	30⅜	31	30½	31⅞	30½	32	31⅛	...	...	31⅞	31½	358,454
Preferred	100	94⅜	94	94½	93½	95	93⅜	95⅛	94¼	...	...	94¾	94⅛	164,150
Va. Car. Chem	100	36	35½	36½	35⅜	37½	36	37⅜	37½	...	...	37¾	37	19,625
Preferred	100	108⅜	108	108½	108¼	108½	107⅞	...	...	...	...	...	...	2,352

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange; Total sales, 1,102,059 shares. ‡Holiday.

Mexico.

Feb. 3.

Company.	Shares Issued.	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:			
Penoles	2,500	$2,600	$3,000
San Andres de la Sierra	200	10,000	.....
GUANAJUATO:			
Cinco Senores y An. aviadoras	2,000	10	18
Cinco, Senores y An. aviada	400	30	40
Providencia, San Juan de la Luz	6,000	146	155
GUERRERO:			
Garduno y Anexas	7,200	30	35
HIDALGO:			
Amistad y Con	9,600	66	70
Carmen, aviada	1,100	210	250
Guadalupe Fresnillo. Mill	1,000	170	200
Guadalupe Fresnillo Mine	1,400	70	80
Maravillas y An., aviador	1,680	90	110
Maravillas el Lobo	1,000	130	180
Refugio, aviada	12,800	5	7
Sta. Gertrudis y An aviadas	9,600	7	10
Sta. Gertrudis y An., aviadora	28,800	73	75
San Rafael y An., Trompillo	1,200	2,100	2,200
San Rafael y An., aviada	1,200	$750	$780
Soledad, aviada	670	1,150	1,180
Sorpresa, aviada	960	300	315
MEXICO.			
Aldebarren	2,000	30	38
Buen Despacho	3,000	40	48
Dos Estrellas	3,000	3,550	3,600
La Esperanza (El Oro)	3,000	1,500	1,500
Santa Ana, Esperanza	2,400	15	30
NUEVO LEON:			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	700	750
SAN LUIS POTOSI:			
Concepcion y An.	3,000	26	30
El Barreno, aviadora	2,000	100	103
Sta. Maria de la Paz	9,600	247	250
ZACATECAS:			
Asturiana y An	2,500	8	12
Candelaria y Pinos	2,500	40	50
San Carlos y Annexas	2,500	20	25
Sta. Maria de Gaud.	2,500	79	85
MISCELLANEOUS:			
Bartolome de Medina	2,000	85	90
Naica (Chihuahua)	100	11,000	13,000
Natividad (Oxaca) aviadora	1,800	650	750
San Francisco Hac.	6,000	95	100
Union Hacienda	3,000	310	350

Paris.

Feb. 2.

Company.	Location.	Par value.	Latest dividend.	Prices. Opening.	Prices. Closing.
		Fr.	Fr.	Fr.	Fr.
Acieries de Creusot	France	2,000	75.00	1,860.00	1,895.00
Anzin, Coal	France	.....	290.00	5,640.00	5,645.00
Biache-St. Vaast	France	1,000	160.00	3,605.00	3,605.00
Boleo, c	Lower California	500	104.17	2,626.00	2,680.00
Bruay, Coal	France	400	27.50	715.00	719.00
Courrieres, Coal	France	500	110.00	2,875.00	2,891.00
Escombrera-Bleyberg, z. l.	France	350	35.00	720.00	740.00
Huanchaca, s.	Bolivia	125	2.50	89.00	89.25
Laurium, z. l.	Greece.	500	25.00	336.50	330.00
Malfidano, z.	Italy	500	50.00	620.00	625.00
Metaux, Cie. Fran. de.	France	500	22.50	514.00	515.00
Mokta-el-Hadid, i. l.	Algeria	500	40.00	1,010.00	1,015.00
Nickel, n.	N. Caledonia	250	22.50	638.00	650.00
Penarroya, Coal	Spain.	500	45.00	1,185.00	1,155.00
Vielle Montagne, z.	Belgium	30	30.00	850.00	848.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.

London.

Feb. 3.

Company.	Par Val.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:	£ s.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	5 0	4 0	Jan., 1905	5 10 0	5 15 0
Anaconda	5 0	2 0	Nov., 1904	5 7 6	5 10 0
Camp Bird	1 0	9	Feb., 1905	1 11 3	1 13 9
Copiapo	2 0	5 0	Oct., 1904	1 10 0	1 15 0
De Lamar	1 0	2 0	Nov., 1904	15 0	17 6
El Oro	1 0	9	July, 1904	1 1 3	1 3 9
Frontino & Bolivia	1 0	rts.	Mar., 1904	14 0	15 0
Le Roi	5 0	5 0	Nov., 1899	13 9	16 3
*Le Roi No. 2	5 0	2 0	Jan., 1905	16 3	18 9
Mesquital	1 0	3	Feb., 1903	2 6	3 0
Montana	1 0	6	Apr., 1899	6	1 0
Palmarejo & Mex.	1 0	3	Nov., 1904	14 0	15 0
Stratton's Indep'd.	1 0	6	Dec., 1904	5 0	5 6
St. John del Rey	1 0	6	Dec., 1904	12 0	13 0
Tomboy	1 0	1 0	Dec., 1904	1 5 0	1 7 6
Tyee	1 0	2 0	Dec., 1904	2 1 3	2 3 9
*Utah, Con.	1 0	6 0	Jan., 1905	8 10 0	8 15 0
Ymir	1 0	1 0	Mar., 1902	2 6	5 0
European:					
Libiola	5 0	1 6	May, 1904	1 11 3	1 13 9
Linares	3 0	5 0	Sept., 1904	4 0 0	4 10 0
Mason & Barry	1 0	7 0	May, 1904	2 17 6	3 2 6
Rio Tinto	5 0	32 6	Nov., 1904	63 0 0	63 5 0
Rio Tinto, pf	5 0	2 6	Nov., 1904	6 2 6	6 7 6
Tharsis	2 0	7 0	May, 1904	5 5 0	5 10 0
West Australian:					
Associated	1 0	2 6	July, 1904	2 0 0	2 1 3
Cosmopolitan	1 0	1 0	Apr., 1904	4 9	5 3
Golden Horseshoe	5 0	6 0	Nov., 1904	6 15 0	6 17 6
Great Boulder		2	Dec., 1904	1 0 6	1 1 0
Gt. Boulder Perse	1 0	1 0	Sept., 1904	10 3	10 9
Great Fingall	1 0	7 6	Jan., 1905	7 18 9	8 0 0
*Ivanhoe	5 0	5 0	Jan., 1905	7 13 9	7 16 3
Kalgurli	1 0	2 6	Jan., 1905	6 8 9	6 11 3
Lake View	1 0	1 6	Oct., 1904	1 6 3	1 7 6
Oroya-Brownhill	1 0	4 0	Dec., 1904	3 10 0	3 11 3
Miscellaneous:					
*Brilliant Central	1 0	6	Feb., 1905	18 9	1 1 3
*Brilliant & St. Geo.	10	6	Feb., 1905	.....	.....
Briseis Tin	1 0	.....	.....	10 6	11 6
Broken Hill	8	1 6	Feb., 1905	2 3 6	2 4 6
Mt. Lyell	3 0	1 3	Dec., 1904	13 6	14 6
Mt. Morgan	1 0	3	Jan., 1905	2 15 0	3 0 0
Waihi	1 0	2 6	Mar., 1905	6 10 0	6 12 6
Indian:					
Champion Reef	10	1 5	Jan., 1905	1 11 1	1 12 3
Mysore	10	4 6	Nov., 1904	6 12 6	6 15 0
Nundydroog	10	1 6	Nov., 1904	1 7 6	1 8 9
Ooregum	10	9	Dec., 1904	16 11	17 7
Ooregum, pf	10	9	Dec., 1904	1 3 9	1 6 3
South African:					
Angelo	1 0	5 0	Feb., 1905	7 0 0	7 2 6
Bonanza	1 0	7 0	Feb., 1905	1 7 6	1 12 6
British So. Africa	1 0	rts.	May, 1899	1 13 5	1 14 7
Cape Copper	2 0	6	Jan. 1905	4 0 0	4 2 6
Cape Copper, pf	2 0	6	Jan., 1905	3 10 0	3 15 0
City & Suburban	4 0	6 0	Feb., 1905	5 17 6	6 2 6
Consol. Gold-F'lds.	1 0	2 6	Dec., 1904	7 18 9	8 0 0
Crown Reef	1 0	18 0	Nov., 1904	15 5 0	15 15 0
De Beers, preferred	2 10	10 0	Feb., 1905	17 16 3	17 18 9
De Beers, deferred	2 10	2 0	Feb., 1905	17 13 9	17 16 3
East Rand	1 0	4 0	Feb., 1905	8 11 3	8 13 9
Ferreira	1 0	27 6	Feb., 1905	24 0 0	24 10 0
Geldenhuis	1 0	5 0	Feb., 1905	5 10 0	5 12 6
Geduld	1 0	rts.	Mar., 1902	6 18 9	7 0 0
Henry Nourse	1 0	8 0	Feb., 1905	8 0 0	8 5 0
Heriot	1 0	5 0	Sept., 1899	3 12 6	3 17 6
Jubilee	1 0	5 0	Feb., 1905	3 12 6	3 17 6
Jumpers	1 0	2 6	May, 1904	2 5 0	2 10 0
Knights	1 0	.....	.....	5 17 6	6 0 0
Langlaagte	1 0	2 0	Feb., 1905	3 11 3	3 13 9
May	1 0	4 0	Feb., 1905	4 2 6	4 5 0
Meyer & Charlton	1 0	5 0	Feb., 1905	5 5 0	5 10 0
Modderfontein	1 0	rts.	Apr., 1902	10 6 3	10 8 9
Namaqua	2 0	3 0	Dec., 1904	3 16 3	3 18 9
New Goch	1 0	.....	.....	3 6 3	3 8 9
New Kleinfontein	1 0	rts.	Apr., 1902	2 6 3	2 8 9
New Primrose	1 0	3 0	Feb., 1905	3 2 6	3 7 6
Rand	5	5 0	Aug., 1904	10 18 9	11 0 0
Randfontein	1 0	rts.	Apr., 1899	2 16 11	2 18 1
Robinson	5 0	8 0	Feb., 1905	10 0 0	10 5 0
Robinson Deep	1 0	3 0	Aug., 1904	6 3 9	6 6 3
Rose Deep	1 0	3 0	Feb., 1905	8 7 6	8 12 6
Salisbury	1 0	2 0	Jan., 1905	1 12 6	1 17 6
Sheba	1 0	rts.	Feb., 1904	7 9	8 3
Simmer & Jack	1 0	6	Aug., 1904	2 1 3	2 3 9
Village Main Reef	1 0	4 0	Jan., 1905	6 12 6	6 17 6
*Wemmer	1 0	12 6	Dec., 1904	9 5 0	9 15 0

*Ex-dividend.

London (By Cable).*

Company.	Feb. 14 £	s.	d.	Company.	Feb. 14 £	s.	d.
Camp Bird	1	13	0	Esperanza	1	0	6
Con. Gold Fields	7	16	3	Modderfontein	10	8	9
De Beers	17	17	6	Rand Mines	10	16	3
Dolores	1	8	0	Rio Tinto	63	16	3
East Rand	8	8	9	Simmer & Jack	2	7	6
El Oro	1	1	10½	Tomboy	1	7	6

*Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallugy chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Briquetting Sawdust.—We would like some information as to the different processes for briquetting sawdust, slabs, and other sawmill refuse; also the names of the manufacturers of such machinery. A portable machine would be preferable.—H. T. W.

Answer.—Many plans have been suggested for briquetting sawdust, and other material such as you refer to, but we do not know of any which has been put in commercial operation. Various materials have been suggested as binders, and the claim has also been made that in the case of pine sawdust, the material contains sufficient pitch to form briquettes without the addition of any binder. We do not think, however, that this has been proved. The principal manufacturers of briquetting machinery in this country are the Chisholm, Boyd & White Co. of Chicago, and the American Briquetting Machine Co., of Pittsburg. Correspondence with the manufacturers would probably give you a fair idea of what is needed in your case.

Asbestos.—What is asbestos and how does it differ from amianthus?—E. S.

Answer.—Asbestos, as the name is used commonly, means a light-colored fibrous, refractory mineral. In a mineralogical sense, asbestos includes any one of several groups of minerals, all of which show the peculiar structure of flexible fibers. Most asbestos is referred to the amphibole group, some to the serpentine group, and some possibly to the pyroxene group. That used in commerce is largely fibrous serpentine, often called bostonite in trade. When fibrous serpentine is of high grade in color and texture ('noble'), it is called amianthus. Most asbestos bears out the infusible quality from which it was named (incombustible); but some varieties, carrying much iron and sodium (as crocidolite), are readily fusible in the flame of a candle. The true infusible asbestos is essentially a silicate of magnesia, more or less hydrated. The practical tests and uses of asbestos are clear and intelligible; the theoretical study, of the nature and origin of the many minerals included under the term, is one of the most difficult in the field of crystallographic metamorphism.

Half the diamonds that are imported into the United States come by way of Amsterdam, the chief seat of the diamond-cutting industry.

Recent Decisions.

SPECIALLY REPORTED.

PRESUMPTIONS OF LAW NOT OVERCOME BY OPINIONS OF ENGINEERS.—The presumption that an owner of the surface is also the owner of ores found beneath the surface is not overcome by the opinion of an engineer that, if a vein having its apex in ground owned by another continues to dip at the same angle as it dips where it is exposed in upper levels, it will reach the point where the owner of the surface is conducting operations.—Heinze v. Boston & Montana Consolidated Copper & Silver Mining Company (77 *Pacific Reporter,* 421); Supreme Court of Montana.

DECISION OF INTERIOR DEPARTMENT NOT A "JUDGMENT."—Where on an application for a patent to a mining claim, the Interior Department held that a lode vein had not been shown to exist and pass through conflicting patented placer ground at the time the holder of the patent to the placer applied for such patent, and therefore the claimant to the lode claim was not entitled to the conflicting placer ground, such determination did not constitute a judgment that the lode vein did not pass through the conflicting placer location.—Gurney v. Brown (77 *Pacific Reporter,* 357); Supreme Court of Colorado.

CONSTRUCTION OF DRAINAGE CONTRACT.—Where one agreed to pay his just proportion of the drainage of certain mining properties accomplished by another, the drainage having been performed for the benefit of the former, it was immaterial that the former had no control over the pumping operations, and that the party had not agreed to continue same any length of time. And where such contract was executed, want of mutuality was no defense to a suit; nor was the contract uncertain because of its failure to provide what aliquot part of such expenses each should bear.—Fisk Mining Company v. Reed (77 *Pacific Reporter,* 240); Supreme Court of Colorado.

LIMITATION ON RIGHTS OF VEINS APEXING WITHIN OTHER CLAIMS.—The right of an owner to pursue a vein apexing within the surface boundaries of his lode claim on its dip downward outside of the vertical lines of such claim, which is given by the Revised Statutes of the United States, section 2332, cannot be deemed to include the right to run a horizontal tunnel from his claim into an adjoining patented lode claim, for the purpose of reaching the vein in its descent through such adjoining claim, in view of the provisions of section 2319, that all valuable mineral deposits in lands belonging to the United States are open to exploration and purchase, and of section 2325 that a patent for any land claimed and located for valuable deposits may be obtained when properly claimed and located.—St. Louis Mining & Milling Company v. Montana Mining Company (24 *Supreme Court Reporter,* 654); Supreme Court of the United States.

DUTIES ON PRECIOUS STONES.—Pieces of white onyx in the form of keystones, fit only to be mounted for use as jewelry, are dutiable at 10% ad valorem as precious stones cut but not set, under paragraph 435, act of July 24, 1897, and not at 50% ad valorem as manufacturers of onyx, not specially provided for, under paragraph 115.—Appeal of A. Lorsch & Company from Collector of Customs at New York; Board of General Appraisers.

Small sapphire jewels intended for use in the construction of phonograph instruments are dutiable either directly or by similitude as precious stones at the rate of 10% ad valorem under paragraph 435, act of July 24, 1897, and not at 35% ad valorem under paragraph 97 of said act.—Appeal of Wells, Fargo & Company from Collector of Customs at New York; Board of General Appraisers.

RECORD OF MINING CLAIMS NOT ESSENTIAL.—A despatch from Carson, Nev., says that the United States Circuit Court, in the case of Zerres vs. Vinina, has decided that it is not necessary that mining claims should be recorded in order to establish title to the lands, provided the proper assessment work has been done. The case related to several claims in the Searchlight district in Nevada. The defendant owned these claims, and had performed all the necessary assessment work, but failed to record the entry. The plaintiff re-located the claims, and then sued for possession. The court held that when the original locater of a claim performs the assessment work, and by other acts of good faith shows that he means to develop the property, he earns title to his claims, and they cannot be legally seized or re-located by another party. The decision was in favor of the defendant.

CONSTRUCTION OF CONTRACT REGARDING OIL LEASE AND EXPENSES UNDER SAME.—A contract for boring an oil well provided that the lessee should provide at its cost all materials of every kind necessary to do the work, and all labor, including labor and material in erecting and maintaining fixtures, and the lessor agreed to pay one-half of the cost of drilling, casing and pumping all wells which did not produce a certain amount of oil per day for the first 30 days. The court held that the lessor was chargeable with one-half of the expense of all the preliminary work of preparing the ground, erecting the derrick, placing and connecting the engine and drilling rig, etc., including one-half of the reasonable value of the use of the machinery owned and furnished by the lessee.—Far West Oil Company v. Witner Brothers Company (77 *Pacific Reporter,* 61); Supreme Court of California.

Abstracts of Official Reports.

Premier (Transvaal) Diamond Mining Company, Ltd.

The report of this new South African company covers its second official year, ending October 31, 1904. The property is still under development, and no dividends have yet been distributed, but equipment has been paid for out of earnings and the balance now on hand, the result of the year's work, is abundant for, and will be applied to, the completion of all additions and improvements necessary for the profitable working of the mine.

The most promising feature in the outlook is the large size and fine quality of the stones. A certain lot of stones, weighing 385 carats, when cut, yielded brilliants weighing 191 carats, and three other stones, weighing 689 carats, were valued at £14,066 or over £20 per carat.

The number of loads, of 16 cu. ft. each, taken from the mine during the year was 1,289,234, at a cost of 2s. 7.6d. per load, including all development work. The yield was 749,654 carats, or 0.80 carat per load. This yield per load is less than it was during the previous year, owing to the inclusion in the working face of a thick overburden of lean material, but is superior to the record of the De Beers and Kimberley during the same period—0.54 carat per load.

A new washing plant, thoroughly equipped in every detail, is being erected. This will give a total capacity of 20,000 loads per 24 hours.

The plant is so situated as to give abundant space for the disposal of tailing, and also to permit the use of steam shovels in the mine. This plan is expected not only to economize labor, but also to minimize loss from theft.

Additional area has been acquired carrying abundant water supply, and a system of dams is under construction, which, when completed, will have a storage capacity of 246,000,000 gal., insuring steady operation of the plant.

A standard gauge track, 5.5 miles long, is being laid, to connect the mine with the main road at Rayton Station. The branch will terminate over the bunkers of the central boiler plant. This arrangement is expected to reduce the present cost of fuel nearly one-half.

The returns realized from sale of diamonds was £866,030 and the net income for the year, after paying all development, mining, milling and management costs and all office and agents' expenses in Johannesburg and London, was £667,738. The amount brought forward raises this balance to £770,601. The original capitalization was 80,000 shares of £1 each. On January 17, 1905, these were converted into 160,000 preferred shares of 5s. each; carrying a cumulative dividend of 250% per annum, and 320,000 deferred shares of 2s. 6d. each.

Consolidated Cariboo Hydraulic Mining Company, Ltd.

The report of this British Columbia placer-mining enterprise covers the year ending November 30, 1904. A description of the property and an account of the occurrence of rare metals in its gravel will be found in another column of this issue.

Owing to exceptionally unfavorable weather conditions, the supply of water was sufficient for a run of only 89 out of a possible season of 212 days. The available supply diminished from 103,389, at the opening, down to 81,500 miner's inches (1.5 cu. ft. per min.), at the close of the season, and the duty ranged from 8.9 down to 5 cu. yd. per miner's inch, during the run. The upper gravels and volcanic mud, upon which the year's work was conducted, averaged 6.42c. per cu. yd., although some bottom gravel upon which a short experimental run was made, gave a return of $1.52 per yd. This gravel, of which a great deposit has been exposed, will be attacked by a hydraulic elevator next season.

A sluice tunnel, starting at the dump on the Quesnelle river, passing through solid bed-rock, in order to underlie the deepest gravels, is in progress, 260 ft. being finished, at a cost of $12 per foot. It has a section 10 ft. square, and portions of it are heavily timbered. Two Gardner electric drills are used, in two shifts, the rate of advance reaching toward the end of the season 38 ft. per week. When complete, the tunnel will be 1,200 ft. long, and will have a sluice 7 ft. wide, 3 ft. deep, and a walk 2.5 ft. wide, for the sluice tenders.

Alternative schemes for increasing the company's water supply are being investigated. One of them proposes to tap Morehead lake, on the western slope of the range bearing the same name, by a 15-mile ditch; this will assure 2,500 miner's inches and is estimated to cost $122,500. The other source is Spanish lake, at about the same distance in the mountains, north of Quesnelle lake, and surrounded by heavily timbered slopes, from which the snow does not disappear until late in the summer. This will afford equal supply at a cost for construction of $245,000.

Details of the season's work were these:

Total time, days	88.7
Water used, miner's inches	225,198
Total material washed, cu. yd.	1,461,341
Duty per miner's inch, cu. yd	6.49
Yield per cu. yd., cents	5.88
Gold product, ounces	5,038
Value of product	$85,936

The profit and loss account was as follows:

Bullion recovered	$85,936
Store profit	3,892
Total receipts	$89,828
Operating expenses	$88,424
Depreciation	1,289
Office	1,342
Interest and exchange	25,945
Total expenses	$117,000
Deficit on the year's work	$27,172
Debit balance brought forward	24,536
Total deficit	$51,708

The company is capitalized at $4,000,000, and has in addition an outstanding issue of bonds amounting to $400,000. Its other liabilities total $164,186, of which $46,000 is accrued interest on bonds, the remainder being accounts payable.

Doubtful Mining Companies in California.

As our readers know, Mr. Lewis E. Aubury, State Mineralogist of California, has been for some time endeavoring to bring the law to bear on certain companies and individuals who have their headquarters in California, and send out fraudulent prospectuses and circulars relating to the sale of mining stock, chiefly to parties at a distance. As far back as 1887, the California legislature passed a law making officers, or agents, of corporations existing in the State, liable to heavy penalties for making false representations, with the intent to defraud investors of the general public. This law, however, contains the following clause: "Provided that this act shall be construed to apply only to corporations whose capital stock has been or hereafter shall be listed at a stock board or stock exchange in this State, or whose shares shall be regularly bought and sold in the stock market in this State."

It will be seen, therefore, that it does not apply to the parties whom Mr. Aubury is especially anxious to reach. They do not list their stocks, being aware that no reputable exchange in California would permit dealings in them, and, consequently, the above provision of the law exempts them. Mr. Aubury is now preparing to urge on the legislature the repeal of this provision.

The expansive force of water is nearly 90 lb. per sq. in. for 1° F. increase in temperature.

Wrought iron expands with a force of almost 200 lb. per sq. in. for each degree of increased temperature. The contracting force is the same on reducing the temperature.

Diamonds are found at many places in Central and South America, but, as the stones are mostly small and apt to be defective, there is little market for them.

Phosphorized copper should be made only from a superior grade of copper, containing no more than 0.04 per cent oxygen, with 0.05 to 0.10 per cent phosphorus.

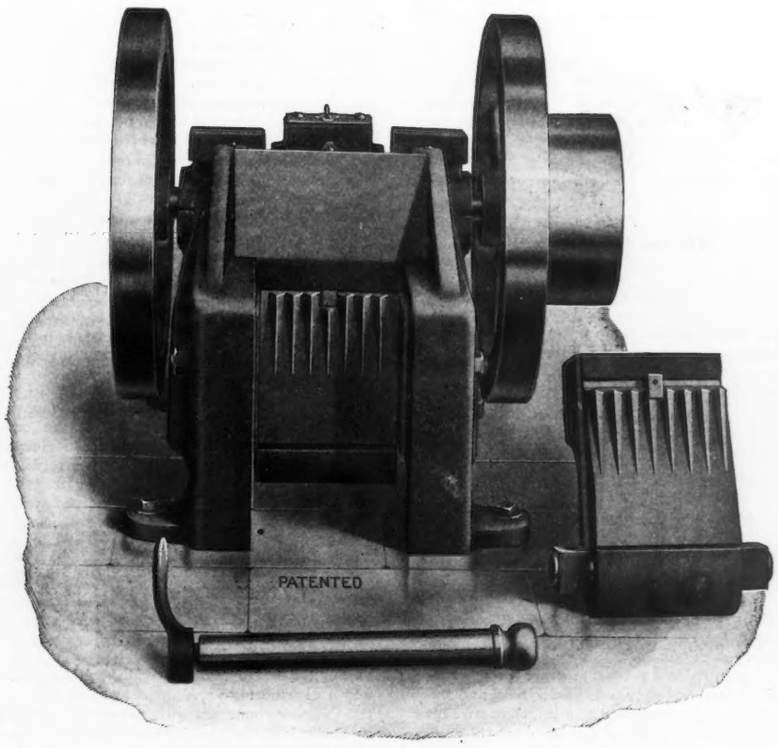
The addition of 2 or 3 per cent nickel or manganese to pure copper secures increased hardness and greater tensile strength.

A slab of quicklime an inch thick, forming the dome of an electric furnace, can be removed by hand, although the interior surface of the slab is melting with the intense heat.

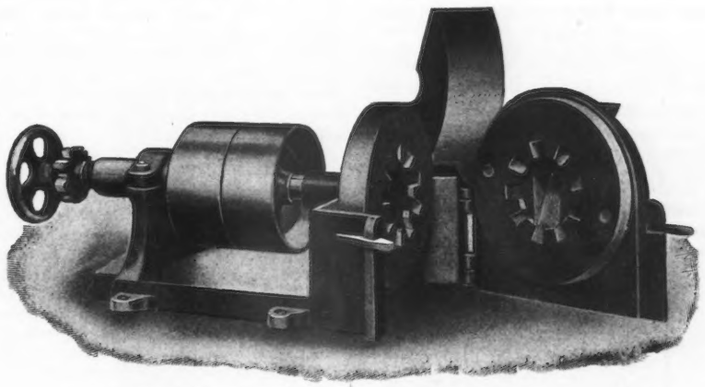
New Sampling Machines.

The accompanying illustrations show two sampling machines for laboratory work, which have been designed and are being introduced by the Sturtevant Mill Company, of Boston. The fine crusher is built on the same lines as the large crushers of this type, except that it is made especially adaptable to cleaning. It is made in two sizes, the jaw openings being 2 by 4 in. and 2 by 6 in. respectively. The machine illustrated is the 2 by 6 in. size, which weighs about 600 lb., and has a capacity of 250 to 600 lb. per hour, according to the material, crushing to sand size without screens. The front head and stationary jaw may be easily and quickly removed, when both crushing surfaces are exposed for cleaning up after each sample. The jaws and shields are of manganese steel, and the toggles of bronze, working in tool-steel seats. The object has been to use the best material throughout. They are built for specially fine work, and will crush the hardest ores to ⅛ in., and finer, without clogging. These machines have met with much success, and there are now a large number in use in laboratories. The 2 by 4-in. crusher, can be run by hand or power as desired.

The sample grinder will take the product from the crushers, or any product which has been broken to ¼ in. and finer, and will reduce it to 200 mesh without screens. It is also adjustable for coarser work by simply turning the hand wheel. It produces a very even product. The sampling grinder is very accessible for cleaning, as its grinding disk can be swung open like a door. This also makes it easy to replace the disks or plates, which are the only wearing parts.



ROLL-JAW CRUSHER FOR THE LABORATORY.



SAMPLE GRINDER FOR THE LABORATORY.

Emery Trade of Greece.

For over 80 years the Greek government has held a monopoly, leasing the emery-bearing land to the peasantry, and collecting as royalty, 7.9 drachmas ($1.52) per ton on the mineral shipped. This tax is equivalent to about 15% of the cost of production, including the charge of transportation to Syra, the depot for Naxos emery. The price paid miners for delivery, f. o. b. Naxos, is 43.2 dr. ($8.34) per ton, and to transport the ore to Syra, the export point, costs about $1.89 per ton, making a total of $10.23 per ton. The agents of the government then sell the emery at the agreed price of 106.5 dr. ($20.55) per metric ton, f. o. b. Syra. It should be stated here that the difference between the purchasing and selling prices, amounting to $10.32 per ton, or say 50%, is used as needed to liquidate the public debt.

Calculating on exports of 5,813 tons emery, as shown in 1903, the government's revenue from this source amounts annually to nearly $60,000. Nearly all the Naxos emery mined is exported to the United States, which, by the way, also imports appreciable quantities from Turkey. More than half the world's supply, estimated at 25,000 to 30,000 tons per annum, is consumed in America. And yet the domestic production is less than 5,000 tons yearly, reported in Massachusetts, New York and Kansas. American consumers pay 3.5c. per lb. for Naxos emery flour in kegs, and 5 to 5.5c. per lb. for grains at New York; while for domestic flour quotations vary from 1.5 to 3.5c., and for grains from 2.5 to 5.5c., according to point of delivery. These prices are appreciably lower than for corundum and steel emery, products that have become competitors of natural emery.

It is gratifying to see that the Grecian emery traders are exercising more care in selecting mineral. Better facilities for handling the emery as it is mined and shipped have introduced much needed economy.

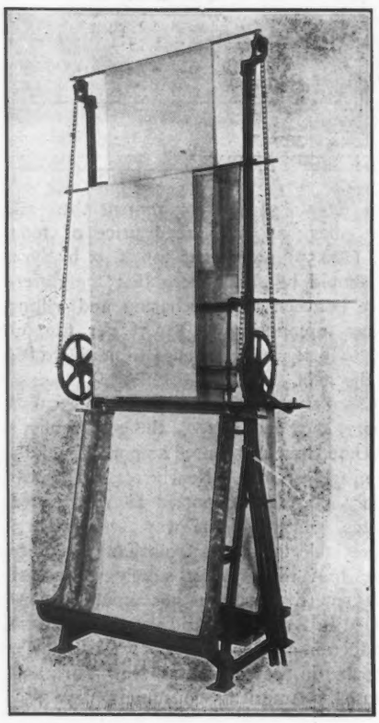
For abrasive purposes Naxos emery is of high value, and its market price will be maintained if exporters are not tempted to again mix it with the Asia Minor product that is worth about two-thirds less.

The Jeugner storage cell resembles the Edison; the active material consists of iron and nickel hydrates in a 20 per cent caustic potash electrolyte. It is used in Sweden.

A Blue-print Washing and Drying Machine.

This machine has been designed to economize space, time, labor and the bulky paraphernalia required in any printing department that has to make 25 or more large blue-prints a week.

The exposed sheet is doubled over a hardwood stick, sensitized side out, and is hung in position over the washing trough at the bottom of one side of the vertical frame shown in the cut. The sheet is then washed by two horizontal sprays of water. This method has the advantage of removing the surplus ferroprussiate without soaking the paper, so that drying takes less time. The stick is then attached to the two vertical sprocket chains, and the sheet is drawn up between rods which remove the adhering water.



BLUE-PRINT WASHING AND DRYING MACHINE.

While this process is being repeated on successive sheets, the preceding ones remain suspended in the air to dry, and are finally removed automatically from the opposite side, where they are held by a rack until wanted.

The machine is built in four sizes; the largest one takes a print 42 by 100 in., occupies 32 by 52 in. floor space, is 11.5 ft. high, and weighs 400 lb. The apparatus was patented, and is manufactured by C. T. Pease, of Columbus, Ohio.

The water power of Russia, when harnessed to electric motors, can develop about 10,000,000 kilowatts, according to a recent estimate.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

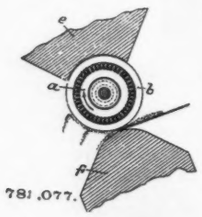
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending January 31, 1905.

780,984. PROCESS OF MAKING TIN OXIDE.—Hans Foersterling, Perth Amboy, N. J., assignor to the Roessler & Hasslacher Chemical Company, New York, N. Y. A continuous process of making tin oxide, which consists in gradually supplying tin to a suitable furnace, heating the tin thus supplied in the presence of air, said air having been heated previous to contacting with said tin to a temperature such that the temperature of the contacting air and tin is above that at which the lower discoloring-oxides are formed.

781,009. PROCESS OF TREATING ACETYLENE FOR FACILITATING ITS TRANSPORTATION AND STORAGE.—Ernest A. Le Sueur, Ottawa, Canada. A process of effecting transportation and storage of acetylene which consists in condensing it, at atmospheric or other comparatively low pressure, to the liquid or solid form by refrigeration, in transporting it in the refrigerated condition and then admitting it to a storage-receiver, of many times the volume of the refrigerated acetylene, possessing a comparatively high temperature.

781,077. ELECTRO-MAGNETIC ORE SEPARATOR.—Erich Langguth, Euskirchen, Germany. In a magnetic separator, the combination with pole-pieces of an armature rotating



781,077.

between said pole-pieces and having windings, a shield of magnetic material mounted directly on said armature and rotating therewith, means for feeding the material to be separated to said armature, and means for collecting the separated material.

781,078. ART OR PROCESS OF REMOVING SCALE FROM WIRES, RODS, ETC.—Archibald B. Legnard, Waukegan, Ill. A method of removing scale from wires or rods consisting in coiling the same around a roll of small diameter as it passes continuously from one spool or reel to another and thereby subjecting it to short sharp bendings and crinkling and loosening the scale from the surface of the wire or rod.

781,086. REINFORCED CONCRETE STRUCTURE.—Ray C. Newhouse, Columbus, Ohio, assignor of one-half to Silvio A. Casparis, Columbus, Ohio. A reinforce for concrete or other structures comprising a tension member composed of a pair of interwoven or twisted elements, and shear members each composed of a length of wire bent upon itself and formed into an open-sided rectangle, the sides of which constitute anchors and the base a tie, the tie being interlocked or interwoven with the tension members.

781,133. PROCESS OF TREATING ZINC-SULPHIDE ORES CONTAINING IRON.—Chauncey E. Dewey, Denver, Col., assignor to The American Zinc & Chemical Company, Denver, Col. A process of treating sulphide ore containing iron and zinc, consisting in roasting the ore, placing it in water, and maintaining the ore in suspension in the solution by the introduction of sulphurous gas and air.

781,150. FURNACE-CHARGING APPARATUS.—Edward W. Lindquist, Chicago, Ill., assignor to Ralph Baggaley, Pittsburg, Pa. The combination of a furnace having a charge-receiving opening, a conveyer discharging into said opening, and means for reciprocating the conveyer along the opening during the delivery of the charge, said opening being of greater width than the delivery end of the conveyer.

781,175. DUMPING-CAR.—Charles Barrett, Somerville, Mass. A dumping-car comprising in its construction a truck, a truck-plate fast to said truck, an intermediate plate swiveled to said truck-plate, trunnions fast to said intermediate plate upon opposite sides thereof, respectively, a dumping car-body, and brackets fast to the under side of said body, each of said brackets provided, respectively, with a vertical slot opening through the under side thereof and adapted to receive one of said trunnions whereby said body is removably attached to said intermediate plate.

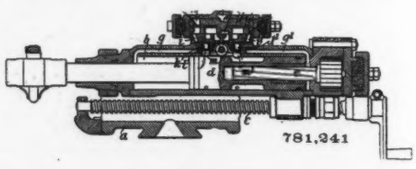
781,213. COKE-OVEN APPLIANCE.—Heinrich Koppers, Essen-on-the-Ruhr, Germany. The combination with the stand-pipe having the cup-shaped top member and the gas-main, of an elbow compensation-joint provided with loops or handles, one foot of the said elbow terminating in a semispherical journal member resting in the cup-shaped top member of the said stand-pipe and having circular grooves and the other end of the elbow terminating in a short tube and connected with and supported by the gas-main.

781,230. METHOD OF COATING METALS.—Hugh Rodman, Cleveland, Ohio. A method of coating a metal which consists in subjecting it to the action of a molten coating metal, and maintaining in said coating metal a suitable proportion of an alkali metal.

781,234. WELL-DRILLING MACHINE.—Leonard D. Shryock, Marietta, Ohio, assignor to Leidecker Tool Company, Marietta, Ohio. In a well-drilling machine, the combination of a drilling-cable, an actuating member, and power-transmitting mechanism connecting the cable and said member and constructed and arranged to exert a pull on the actuating member in direction substantially in the plane of movement of the latter and to exert a pull on the drilling-cable in direction oblique to said plane of movement.

781,240. METHOD OF RENDERING ASPHALTIC OILS MORE LIMPID.—Eric A. Starke, Alameda, Cal. A process of rendering heavy mineral oils more liquid which consists in subjecting the oil to a partial distillation at a temperature ranging from 500° to 650° F., and reuniting the distillate and residuum and mixing the mass thoroughly.

781,241. ROCK-DRILL.—William C. Stephens, Camborne, England. In a rock-drill, the combination with a working cylinder and a reciprocating piston therein, of a distributing-valve



781,241

casing for said cylinder provided with air-locks and a distributing-valve in said casing, ports in the cylinder connected with passages extending to said air-locks, bushings in said ports, and movable valves having portions for directly engaging said bushings and wearing portions projecting into the cylinder in the path of the piston and adapted to be operated thereby.

781,255. FIRE-BRICK.—Frank A. Widdows, Stockton, Cal. As a new article of manufacture a fire-brick composed of fire-clay, charcoal and chromium.

781,293. CINDER-LADLE.—Thomas McDonald, Youngstown, Ohio. A cinder-ladle consisting of an outer ladle, an inner thimble so supported that its bottom is not in contact with the ladle, the space between bottoms of ladle and thimble packed with a refractory material, a removable bottom for the thimble, and having means not in contact with the outer ladle for securing the removable bottom to the thimble.

781,300. MANUFACTURE OF METALLIC ALLOYS.—Thomas Prescott, Huddersfield, England. A method of making metallic alloy for casting, which consists in melting a quantity of iron, adding aluminum and zinc to the molten iron, thoroughly melting and alloying the mixture, and finally adding silicon.

781,327. ELECTROPLATING-TANK.—John G. Brothwell and George F. Penley, Torrington, Conn., assignors to the Torrington Manufacturing Company, Torrington, Conn. In an electroplating device, the combination with a rotatable tank, and means for rotating the same, of conducting-rods supported longitudinally therein, an electrode suspended from one of said rods, and a flexible chain conductor suspended from the other of said rods in a manner to freely drag through the solution of the tank.

781,341. PROCESS OF MAKING THE DOUBLE SULPHATE OF ALUMINUM AND SODIUM.—George E. Hipp, Buffalo, N. Y. A process consisting in first dissolving niter-cake and adding thereto a quantity of sulphide of an alkali metal, then clarifying the solution and adding an aluminous product, after which the solution is again clarified, then adding a quantity of solution of sulphate of aluminum, and next adding free acid, after which the whole is concentrated and calcined.

781,372. APPARATUS FOR SLAKING LIME.—Morris Sherman, Chattanooga, Tenn. In an apparatus for slaking lime, a container, a receptacle therein, a water-supply main associated with the container and a movable discharge-pipe located within the container and connected to the main and adapted to be moved into and out of position to discharge water into the receptacle.

781,380. PROCESS OF MANUFACTURING ILLUMINATING GAS.—John C. H. Stut, Oakland, Cal. A process for the manufacture of coal-gas, oil-gas, and water-gas, said process consisting in charging a series of contiguous connected ovens with coal, admitting air over all the ovens and simultaneously admitting a limited quantity of air beneath the fuel, recharging some of the ovens with green coal, then shutting off the air, depositing oil upon the surface of highly heated coal of the other ovens, and passing steam through the fuel in the latter ovens from below to form water-gas which commingles at the top with the coal-gas and oil-gas evolving from the several ovens.

781,437. ELECTRICAL APPARATUS FOR SEPARATING COKE FROM CINDERS, ETC.—Henri Lelarge, Liege, Belgium. An apparatus for separating coke from cinders and other substances, comprising a rotary drum having upon its surface channels or receptacles for receiving the material to be separated, a stationary chute for delivering material from said drum, a movable chute in proximity to said stationary chute, and automatic means for shifting said movable chute into position to deflect coke and other electrically conductive substances from said stationary chute.

781,445. COMBINED GRINDING AND DRYING APPARATUS.—James A. Morrell, Poland, N. Y., assignor of two-thirds to Wallace E. Butler and Eugene J. Kirby, Chicago, Ill. A combined grinding and drying apparatus, comprising a grinding member having perforated walls; a second grinding member coacting with the first member; an air-heater; and means for forcing air from said heater through the perforations in said first member into the space between the members.

781,450. AUTOMATIC DUMPING ORE-ELEVATOR.—Daniel B. McTaggart, Butte, Mont., assignor of one-half to John P. O'Neill, Butte, Mont. The combination of a frame, a car movable therein, said car having an opening near the bottom portion thereof, an apron pivoted to said car and adapted to close said opening when the car is loaded, said apron acting as a discharge-chute for the material passing from the car, when

781,450.

the apron is moved upon its pivot to permit such discharge, an elbow-lever pivoted to said car and designed to engage with the projection formed on the apron for locking the latter, and a relatively long bearing-strip for automatically tripping the locking-lever to cause its disengagement from the projection.

781,470. PACKER FOR DEEP WELLS.—George A. Spang, Butler, Pa. A tubular packer-body contracted longitudinally to form a bulge in its outer surface and a corresponding depression in its inner surface.

781,472. PROCESS OF MAKING CYANIDES.—Joseph Tcherniac, Freiburg, Germany. In the manufacture of cyanides by absorbing hydrogen cyanide by an alkali hydroxide heating the latter to a temperature below its melting-point but above the temperature at which the water generated by the reaction is completely vaporized.

781,493. SCREEN.—James Clements and George Knowling, Brentford, England. The combination of a frame having perforations at the sides elongated in the direction of the plane of the frame to receive transverse wires or rods loosely mounted therein and movable in their own plane, said wires or rods, and a plain surface above and in the same plane as said wires or rods.

781,497. DUMPING APPARATUS FOR UNLOADING RAILWAY-CARS.—William C. Culliton, Buffalo, N. Y. In a car-dumping apparatus, the combination of a foundation, and a dumping-platform pivotally secured to said foundation and having a pivot-timber arranged lengthwise underneath the same, said pivot-timber being provided with reduced portions and having separable metal casings surrounding said reduced portions.

781,502. COMPOSITION FOR ARTIFICIAL FUEL.—Charles L. Dowell, South Bend, Ind., assignor to The Globe Coal Manufacturing Company, South Bend, Ind. An artificial fuel, consisting of bicarbonate of soda, sulphate of soda rosin, saltpeter, common salt, slaked lime and peat.

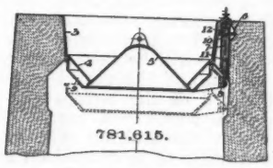
781,520. METHOD OF TREATING ORES.—Hascal A. Hogel and Herbert A. Hogel, New York, N. Y., assignors to said Hascal A. Hogel and David Wallace, New York, N. Y. A method of treating ore to bring the metallic particles thereof into solution quickly, which consists in subjecting the ore to the action of a solution containing certain chemicals, and intensifying the solvent action of said solution upon said ore by atomizing the mixed mass.

781,521. APPARATUS FOR TREATING ORES.—Hascal A. Hogel and Herbert A. Hogel, New York, N. Y.; said Herbert A. Hogel assignor to said Hascal A. Hogel. In an apparatus for treating ore, the combination of the mixing-tank, pipes delivering thereinto, an aspirator in one of said pipes, and a pump connected to said tank and delivering to said aspirator.

781,575. CONVEYING APPARATUS.—Edward N. Trump, Syracuse, N. Y., assignor to The Solvay Process Company, Syracuse, N. Y. In a conveying apparatus, the combination with a rotary cylindrical element, and a casing having a portion thereof inclosing said element, of a packing-ring surrounding said element interposed between the same and the inclosing part of said casing, said ring comprising a plurality of arc-shaped sections having overlapping ends, whereby the continuity thereof is maintained in the adjustments of the same, and a spring secured substantially centrally of the periphery of each section, the ends of said springs finding bearings against the contiguous wall of the casing.

781,614. PORTABLE ENDLESS CONVEYER.—William L. McCabe, Seattle, Wash. In a conveyer, the combination with a framework and conveyer means, of a pivotally mounted platform within said framework, and a cam for guiding the platform in its pivotal movement.

781,615. BLAST-FURNACE-CHARGING APPARATUS.—Thomas McDonald, Youngstown, Ohio. In blast-furnace-charging apparatus, a



781,615.

hopper, a bell arranged to close the same, a deflector-ring outside of the bell and independent of its movements, and means for vertically adjusting the ring independently of the bell.

781,619. BLASTING APPARATUS.—Samuel Rogers, Anniston, Ala., assignor of one-half to Arthur Rogers, Barnesville, Ohio. In a blasting apparatus, the combination with a metal tube provided with an electric heating-chamber at its inner end, of a closed casing surrounding the same, composed of fragile material, and adapted to contain a liquid which when heated to the proper temperature will disrupt the casing.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending January 14, 1905.

414 of 1904. MINING MACHINE.—R. Jones, Carnarvon. Improved undercutting machine, especially intended for breaking down slates.

4,433 of 1904. REFRACTORY BRICK.—L. Williams and H. Tomkins, Stockton on Tees. In producing refractory bricks of siliceous matter, the use of magnesite as the binding materials instead of lime.

6,635 of 1904. ROASTING FURNACE.—G. Grondal, Djursholm, Sweden. A rotating cylindrical calcining or roasting furnace mounted nearly horizontal in such a way that the upper end communicates direct with a furnace for preliminarily drying the ores and the lower end with a furnace for mixing and heating the gases.

7,367 of 1904. SMELTING FURNACE.—O. Simmersbach, Crefeld, Germany. A furnace in which iron ores are smelted by carbon monoxide without any solid fuel or air.

8,155 of 1904. GRIZZLY.—R. Kunicke, London. Improved grizzlies that separate out the large flat pieces of ore which usually slide through the apertures between the bars.

Special Correspondence.

San Francisco. Feb. 7.

The North California Mining Co. acquired within the past three years about 100,000 acres of land in Butte and Plumas counties, in valleys, cañons and basins toward the headwaters of the north and middle forks of the Feather river. Of this land, about one-half is estimated to contain auriferous gravel which will pay to work. The method of working proposed by the company is new to this State. It is intended to dig the gravel at various points with steam shovels, load it on the trains of flat cars and land it at distances of from one to seven miles distant, at places where it may be sluiced. Where water under pressure is available, it is intended to unload the gravel from the cars by the use of the water through nozzles, as in hydraulic mining. The present estimate of costs to carry on the mining in this manner is five cents per cubic yard for digging, one cent per mile per cubic yard for hauling, or an average of four cents, and two cents for unloading and washing. However, as the company has water rights for generating electric power, it is expected, that by working on a large scale the costs may be materially reduced. This company owns several hundred contiguous placer claims along the north fork, the assessment work on which last year amounted to upwards of $50,000. A railroad track will be laid along the side of the cañon, and the gravel will be dug from the bed of the stream and placed on the cars, which will carry it to the point where the sluicing will be done. All this work is to be carried on upon an extensive scale. H. H. Yard, of San Francisco, and Wm. P. Hammon, the dredge owner, of Oroville, are the prime movers in this enterprise, and both have had wide experience in the mining of gravel.

As has been noted in a previous letter, some plaver strikes have been made in the bed of Kern river, near Keyesville, Kern county. A portion of the flow of the river has been removed through the Kern River Power Co.'s canal, so that the miners have been working in 'pot holes,' finding coarse gold in the gravel. The water level in the river has been materially reduced, leaving considerable ground heretofore unavailable to be worked. Very shortly, when the power company needs all the water in the river, the bed for many miles will be used for placer ground, and bed rock may then be reached. The entire length of the river bed, from the point where the water is taken into the canal for power to where it is returned to the river, has been located by the placer miners, who expect to have rich diggings. As far as they have been able to get at the bed, the gravel has proved very satisfactory.

In the superior court of Ventura county a decision has been rendered which makes the Modello Oil Co. the owner of valuable oil territory adjoining its own, and which was claimed by Sutherland Hutton and others, of Los Angeles. Hutton claimed the land by right of prior location, urging that it was located 17 years ago, and that a hole five feet square and 35 ft. deep was sunk in developing. Later the Modello company claimed ownership of the land and developed producing wells there. The court held that the Hutton claimants had not gone far enough in the way of development work to hold the claim, although a little oil was uncovered. As the supreme court has held in similar cases that it is necessary to produce oil in paying quantities, the court rules that the test required by law has not been made.

At the Headlight mine, near Carrville, Trinity county, there is a very large body of low-grade ore close to the surface on the mountain side. This is covered with loam and soil 15 or 20 ft. thick up the mountain for about 300 ft. A flume and ditch have been built and water brought around the mountain, and they have commenced hydraulicking away the soil so as to expose the body of quartz, which will then be quarried out. At this season there is plenty of spare water for this work.

The men who have been prospecting the available dredging ground near Harkey Corners, in Sutter county, report having found gravel at various points running from 25 cents per cubic yard to $27.90. They did not attempt to reach bedrock, being satisfied with the value of the sands near the surface. There seems to be no channel, or even gravel, but simply auriferous sands. These lands are all in the tule belt, and some 17 wells have been bored along a distance of a few miles. The men consider that the material will average $6.69 per cubic yard, but if it averages one-sixth of that it will be good dredging ground.

In this connection, it may be stated that J. F. Elliott, representing El Oro Dredging Co., of this State, has obtained control of about a thousand acres of old placer ground in Tule cañon, Humboldt county, Nevada, where gravel averaging $2 per yard has been found. A large dredger has been ordered with which to work the tract.

The United States government has begun suit against the Sheep Ranch Mining Co., of Calaveras county, for the value of certain wood cut from the government reserve in that county and sold to the company at $4 per cord.

Deposits of opals have been discovered in Black's cañon, near Hiawatha station, some miles north of Harper lake, and southeast from Randsburg, in the desert region. The real opals are found about 30 ft. from the surface, and are like the genuine Australian opals, which are considered finer than the gems from Mexico. Already some small but fine specimens have been found, and the deposit is to be worked extensively.

Denver. Feb. 10.

A large interest in the Imogene Basin Gold Mines Co. property, at Ouray, consisting of about 500 acres of mineral land, adjoining the Camp Bird property, has been sold to the Venture Corporation, of London, the latter purchasing 49% of the holdings. The price is stated to be $400,000. The Camp Bird mines are controlled by the Venture Corporation.

The Department of the Interior has withdrawn more than 138,000 acres of public land from all form of disposal, mining or otherwise, in the Glenwood Springs land district. It is to be withheld for irrigation purposes. As soon as the weather permits, new surveys will be made.

The machinery for our branch mint, in which it is expected that coinage operations will begin about July 1, is arriving gradually and being installed. From a mechanical point of view, it will be model. Each machine will be connected with an independent motor, so that shafting and belting is not required.

It is understood to be the plan of the management of the Colorado Fuel & Iron Co. to gradually operate all its properties with electric power. A contract was closed a few days ago with the Colorado Electric Power Co., of Cañon City, to furnish the Rockville mine in Fremont county with power. Ultimately the company will probably erect its own plants, as experiments made show that electricity as a motive power is cheaper than steam.

The shipments of smelting ores and concentrate from Idaho Springs to the Golden and Denver smelters amounted to 264 carloads during the month of January, showing an increase over the corresponding month, last year, of about 125%.

In the case of the Creede & Cripple Creek Mining & Milling Co. against the Unita Tunnel, Mining & Transportation Co., the United States Supreme Court has affirmed the judgment of the United States Court of Appeals of the eighth circuit in favor of the respondent. This case decides some vital principles in regard to tunnel and lode mining operations, and has been a very interesting one.

In the suit of the Morning Glory Gold Mining Co. against the Mary McKinney Mining Co., the referees, appointed by the United States district court, in this city, expect to file their report within a few days. It is said that two of them agreed to a certain amount, and that the third placed the amount somewhat lower, handing in a minority report.

Deep snows, especially in the southwestern part of the State, have of late interfered with mining operations and the transportation of ores, by rail and otherwise. On Marshall Pass, the highest point reached by the narrow gauge system of the Denver & Rio Grande railroad, the snow is deeper than for 15 years. On the upper workings of the Liberty Bell mine, near Telluride, operations have been stopped, the snow being 8 ft. deep.

Houghton. Feb. 10.

Copper production by the Lake Superior mines showed a slight gain in January, being close to 9,400 tons refined, notwithstanding a number of factors which combined to reduce the output. Last month the weather was quite stormy, and for a few days the rock train service on the various railroads was not satisfactory.

Tamarack is showing increased production, and it is expected that production this month will be the largest for any month in the last two years. Repairs to the broken hoist at No. 5 shaft are completed, and as soon as the rock house and the shaft are completed two more compartments will be available for the hoisting of rock. No. 3 shaft is producing 1,000 tons of rock daily, and the output from No. 2 shaft is of an excellent quality. Atlantic's production is suffering because of the accident to the hoist at "D" shaft, which caused the suspension of operation there for two weeks. It is the purpose of the management to make good the deficit this month, if possible. Additional men have been put on the sinking forces in the two active shafts, and it is purposed to sink them to the boundary line as rapidly as possible. This will permit the extraction of copper values in the lower levels without delay, and enable the management to figure to a few months the life of the property. It will also be possible to combine the rich and lean grades of ground, which should result in an average output each month, and prevent violent fluctuations in the mine's earnings. Waste, instead of being hoisted and discarded at surface, will be dumped into the exhausted openings below the

point of extraction, and a large economy in operating expenses should result.

An explosion of 200 boxes of dynamite, weighing 50 lb. each, which were stored in a magazine at the eighth level of No. 3 shaft at the North Kearsarge branch of the Osceola Consolidated mine on Feb. 8 killed six men and injured several others. As soon as the accident occurred a searching party was organized and rescued several men, who were found overcome with gas and smoke. Some of the rescuers were themselves overcome and had to be carried to the surface, where they were revived after a few hours' efforts on the part of the physicians. Only one body has been recovered, and it was impossible for the relief party to penetrate beyond the eighth level, owing to the foul air. No. 3 shaft and No. 1 shaft, adjoining on the south and connected with the former, have been sealed, to prevent a spread of the flames, which were discovered in the timbering. As it is an amygdaloid mine, very little timber is required underground, and the fire should soon spend its force. The explosion wrecked the plates in No. 3 shaft, at the sixth, seventh and eighth levels, damaged slightly the shaft and rock house and tore up and twisted the skip rails in the shaft. It may be a few weeks before operations can be resumed, but exact data is unobtainable, as very little investigation has been possible, owing to the gas and smoke in the workings. No. 3 shaft was shipping 1,000 tons of rock daily, and No. 1 about 750 tons, so the output of the Osceola company will be largely curtailed for the present. No. 1 shaft had just resumed shipments to the mill, after an idleness of four weeks, caused by caving ground. No. 5 and 6 shafts at the old Osceola branch are shipping nearly 1,000 tons daily.

Mohawk's January output was the largest in the history of the mine, and the refined copper yield also showed improvement. Conditions at this property are greatly improved over those existing several months ago, and constantly improving results may be expected this year. Shipments from new No. 5 shaft have been commenced, sinking having been resumed there a few days ago. Until a depth of 170 ft. is reached, where the first level will be established and drifts extended north and south, shipments will be small.

No. 13 shaft of the Calumet & Hecla, on the Osceola amygdaloid lode, is supplying one head at the mills at Lake Linden, and the rock is yielding 18 to 20 lb. of copper per ton. Showing at Nos. 19 and 20 on the Kearsarge lode is fairly good, but No. 21, on the southeastern corner, is poor, the formation being broken and the copper values irregular.

Scranton. Feb. 13.

The following figures show the production of the various companies in the second district during the past two years:

	1903.	1904.
Scranton Coal Co	1,271,260	1,311,078
Delaware & Hudson	1,218,355	1,087,414
D. L. & W. R.R.	672,785	742,124
Hillside Coal & Iron Co	831,032	715,627
Temple Iron Co.	427,192	412,965
North End Coal Co.	88,939	117,147
	4.509,563	4,466,335

The number of mines in the second district is 34, and none of these was idle last year. The number of tons shipped to market during 1904 was 4,042,650, as compared with 4,131,907 in 1903. It is interesting to note that the number of fatal inside accidents to the number of tons of coal produced was one for every 204,980 tons in 1903, while in 1904 there was one fatal accident for every 124,065 tons mined. The number of electric locomotives employed in 1903 was 25; in 1904 there was 27. There were four new mines opened in 1903 and four in 1904. One mine was abandoned in 1903 and one in 1904.

Another strike is threatened at Coxe Bros., Incorporated, at Drifton. Dissatisfaction has been expressed among the drivers and those employed in handling the coal in the mine, owing to the fact that they are not paid for the noon hour work, in accordance, as they claim, with the finding of the Conciliation Board. A deputation waited on Mr. Hudlick and threatened to strike unless their claims were granted. It is stated by the officials that there is no danger of a strike and that the matter in dispute will be amicably adjusted.

The threatened strike at the Exeter colliery at Pittston has blown over. All the men are at work, although the company that owns the mine has made no concessions from the stand they have taken, that owing to the dangerous character of the workings the miners should remain below with the laborers until all the coal cut was loaded into the cars. This regulation is peculiar to this particular mine, and has not been sought to be enforced in any other colliery in the anthracite region.

The report for the fourth anthracite district has been just published by David J. Williams, the mine inspector. In 1903 the fourth district had a bad prominence for the number of accidents recorded for it. 1904 happily shows a decrease in fatalities. A total of 5,294,265 tons were mined in this district, involving 34 fatal and 71 non-fatal accidents. The accidents fatal and non-fatal are largely attributable to falls of roof. The production of coal for the various mines in the fourth district is computed by Mr. Williams in the following table:

	Tons.
D. L. & W. R.R. Co	3,294,595
Lehigh Valley Coal Co	569,927
Jermyn & Co.	347,969
Penn. Coal Co	327,893
D. & H. Co.	319,829
Elliott McClure & Co	131,565
Wm. Connell & Co	122,468
Austin Coal Co	63,347
Gibbons Coal Co	25,505
Brookside Coal Co	41,154
Total	5,294,252

The number of tons produced per fatal accident inside was 165,445. The number of mines operated in the district is 41, all in operation.

Former Mine Inspector Roderick has completed a report of the properties of the Blue Creek Coal & Land Co. in West Virginia, which is controlled by Scranton capitalists. The company owns 3,507 acres in fee simple, 11,589 in coal rights, and 2,071 in mineral rights. There are five veins of coal, estimated to contain over 500,000,000 tons of coal. It is not proposed by the company owning these vast interests to operate its own coal lands, but to lease its rights. For this purpose several companies are being organized in Scranton which will secure leases from the owners and will sink shafts as soon as arrangements can be made. There is room, it is stated, for 40 leaseholds, each producing an average of 500 tons a day, and applications have been made for leases for the majority of these.

The directors of the Pennsylvania railroad have created the office of coal freight agent, to which R. H. Large, now division freight agent at Altoona, has been appointed.

Salt Lake City. Feb. 10.

The smelter smoke problem in the Salt Lake valley is still unsolved, but investigation made by Dr. Franz Meyer of New York has convinced him that so far as the Utah Consolidated smelter is concerned the application of water in the condensation or elimination of the fumes is practical. Acting upon his report, R. H. Channing, Jr., the general manager, has filed upon a portion of the waters of the Jordan river, and has ordered Dr. Meyer to draw plans for a plant, which the latter estimates, will cost about $150,000. Mr. Channing believes he has devised a successful plan for getting rid of the acid waters, which is none other than the piping of the same into the Great Salt lake. According to Dr. Meyer's calculations, a volume of water equal to 10,000 gal. per minute will be required in the operation of the entire plant, smelter and all. In the expenditure of the amount mentioned, provision will be made for the saving flue dust and other valuable substances.

Some interesting developments have been made lately in the Daly-West mine at Park City—between the 800 and 900-ft. levels. The ore forms in a fissure, and the vein measures in width from two to six feet.

For several months the Butler-Liberal Mining Co. operating at Bingham has been running a long tunnel for the purpose of opening up its copper ledge. The adit has been finished to the length of 1,500 ft. An upraise will now be made to connect with a winze sunk from the upper tunnel.

The copper shipments from the Salt Lake copper smelters last week aggregated 696,816 lb., the plants contributing being: Utah Consolidated, 364,859 lb.; United States, 29,452 lb.; Bingham Consolidated, 307,505 pounds.

The Utah Copper Co. of Bingham reduced to concentrate during January about 650 tons of ore per day, or 20,000 tons for the month. The management installed a set of Hartz jigs about a week ago for the purpose of experimenting with them on the coarser ores, and if they prove satisfactory, others will be installed. Tables and vanners, only, have been used heretofore, owing to the fineness of the Utah's ore. If the jigs prove successful, the management expects to put through a larger tonnage than now is the case with only tables and vanners working.

Spokane. Feb. 9.

J. L. Harper, of Ferry county, Washington, has introduced a bill in the State legislature to revise the methods of assessing mines in this State. Mr. Harper is manager of the Belcher, the Moonlight and the Jupiter-Ammon Mining Co., near Republic, Wash., and of the Washington Smelting & Refining Co., which plans to erect works. Under existing laws, mines are assessed upon their market value, the same as all other property. Needless to say, there is great difficulty in arriving at the market value of a mine. Mr. Harper proposes to modify the law, when applied to mines producing "gold, silver, copper, lead, nickel, cobalt, or other valuable minerals," although he neither includes nor excludes iron or coal. He proposes to assess the mine for the net value of the ore after deducting all expenses of mining, treatment and transportation, and he would subject to assessment only profitable ore, blocked out on three sides.

The Van Horn brothers and associates, of Davenport, Wash., have sold the River Basin and the Silver Seal properties, near

Cedar Canyon, Wash., to the Turk Mining Co. The price is not given. A. W. Turner, president of the Turk company, has resigned.

The Moose Creek placers, on Newsome creek, near Elk City, Idaho, have been sold to the Mercantile Finance Co., of Chicago.

Ore hauling from the Copper King mine, near Chewelah, Wash., has been hampered by bad roads.—The Jay Gould mine in the same camp is working again with four men.—Manager T. F. Hertzell has started a crew on the Enterprise, a high-grade silver producer.

The Ruby Mining Co., of Nighthawk, Wash., promoted by J. M. Hagerty, announces that it has ordered a 20-ton electro-chemical mill from Baker & Burwell, of Cleveland, O. The orebody is from three to twenty feet in thickness, and has been opened 1,400 ft. long and 200 ft. deep.

Big Cœur d'Alene mines are adopting a new method to provide insurance for working miners. It is modeled after the system long used at the old Drum Lummon mine in Montana. The Federal Mining & Smelting Co., the Hecla Mining Co. and the Morning mine, which is owned by Larson & Greenough, will each incorporate a provident and accident insurance association. The association will be managed by a board of trustees, of whom half will be chosen by the mine management and half by the employees. It will be imperative for each working miner to join and to pay $1 a month to the relief fund. Miners employed during any month for less than 10 days will be charged 10 cents per day for the relief account. The mine management will subscribe into the relief fund 50% of the amount paid by the employees.

Advices from Keller, Wash., say that the Gold Cord mine, owned by the Silver Creek Mining Co., an Indiana corporation, was 'jumped' Jan. 1 because of failure to do assessment work. The managers are reported as giving a reason for neglect to do the work that they were putting in a sawmill and doing other work around the camp.

The Blanchard smelter, put in recently for the Turk Mining Co., Cedar Cañon, Wash., has had its troubles. Edgar B. Van Osdel, who erected it and operated it for a while, is back to Spokane. He says that a number of alterations are being made by Mr. Eberline, a Butte smelter man, who is now in charge. Mr. Van Osdel made several runs and managed to secure fusion, but never got a separation of slag and matte.

Butte. Feb. 8.

All Butte mines of the Amalgamated are being operated to their capacity, the output averaging about 10,000 tons of ore per day. Three smelters, the Washoe, Boston & Montana and Butte & Boston, are treating the entire production and also about 250 tons from the Clark mines. United Copper has been having bad luck recently. Three weeks ago it lost the 1,700-ft. level of the Rarus mine by water and has not yet recovered it. While tanking the water to the surface the flat cable parted near the tank and the tank went to the bottom with two men on it, killing both. The Rarus is one of Heinze's principal ore producers. The company expected some time ago to be pumping from the working of the Lexington by Jan. 1, but the beginning is still a month off. The machinery is not yet in place. Heinze has a lease and bond on the property. It will expire in April of 1906. At least one year will be consumed in unwatering the old openings.

W. A. Clark has begun work on a 350-ft. brick stack designed for carrying into the upper air current the fumes from his smelter. The stack and furnaces will be connected by a long flue. The smelter is to be enlarged during the next six months. The output of the Clark mines exceeds the capacity of the plant, and the increase in size of the latter is necessary to meet demands.

C. E. Lentz, president of the Lentz Gold, Copper, Silver Mining & Smelting Co., is directing the work of development on the company's property in Madison county. The company is driving for a vein of high grade gold ore which it expects to strike about 40 feet in advance of the face of the tunnel. The vein is not wide above, but the ore is rich, ranging from $300 to $470 per ton.

The Leadville Mining & Smelting Co. is preparing to open its group of 12 claims 17 miles northeast of Butte. So far little development work has been done on the property, the deepest shaft being only 50 ft., but the surface indications warrant the belief that a body of good ore will be found deeper. With the exception of a few shares held in Butte, all of the stock is controlled by Iowa men.

The Liverpool company shipped a carload of silver ore from its Jefferson county property last week that netted about $25,000. It was the selected product of the vein in the lower levels.

The Montana Zinc Co. has not succeeded in getting its machinery in smooth running order. Clarence B. Wisner, president of the corporation, says he expects to have all difficulties overcome by the first of the month.

Eastern men are figuring on buying the Little Tom, London and "77" claims lying just north of some of the heavy copper-silver producers. The property is owned by George Pascoe and T. M. Adams, of Butte, and is under bond to Frank C. Lavigne, of Spokane. The ground has been examined by the proposed purchasers.

The shaft on the Raven property has reached a depth of 700 ft., and will be continued to the 800 as soon as a station is cut at the present depth. Ore shipments have been suspended for the time being, but will be resumed when the veins are cut at the 800.

Cross-cutting is in progress north and south from the 1,000-ft. station of the Belmont, a Heinze property. No ore has been struck in the prosecution of the work.

C. W. Ellingwood, who is working the Goldsmith mine under lease shipped a carload of high-grade silver ore last week and has enough in the bins for another shipment. This is the best silver mine in the Butte district.

Bisbee. Feb. 10.

On the 1,100-ft. level of the Lake Superior and Pittsburg mine, northeast, very rich ore bodies have been cut recently. These have been in a section of the mine that has not been explored extensively, but has been looked on as promising. About 45 tram cars of ore are coming up daily now, in the course of development, ore running not far from 20 to 25% copper. That this ore, found at the depth of 1,100 ft., should be carbonates and manganese, is an indication of the depth of ore bodies liable to be encountered. The citizens of Bisbee are more interested in finds at this mine than in any other, around the camp, for they have about 4% of its stock, received at par, and they already have a profit, should they desire to sell, of approximately $400,000.

The New York company that has been for years holding the old Copper King group of claims, adjoining the Queen on the east, has lost its rights. Two jumpers, Messrs. Johnson and Scribner, of this city, now have the group. The company for some years did not carry out its assessment work, and these two men jumped the property. They have now received title through the United States Supreme Court. It is stated that they will give an option for development to a Michigan and Minnesota syndicate. Now that the mine, which has a shaft 600 ft. deep, is in the hands of energetic men, it is sure to be explored thoroughly.

Work at Houghton Development, which is owned by Michigan men, is said to show copper ore, and the prospects are looked upon as good.

Copper Queen production continues at the enormous pace recently established, and in one recent day shipped 174 tons of metal, the production of 24 hours. The sixth furnace is now in operation, and a seventh will shortly be in blast, so the production can soon be averaging up to 340,000 lb. a day. This will put the Copper Queen even with the Boston & Montana as a producer, and give Arizona the equivalent of the country's greatest mine. When Copper Queen's Holbrook shaft is completed and the new machinery in commission the shaft will increase its production from 1,400 tram cars daily to more than twice as many.

The new Benson smelter is proving valuable for Dragoon and Barrett districts, and ore is beginning to come out for treatment there. Half a dozen small properties in the Dragoon mountains are beginning to ship, the Arizona Consolidated chief among the number. At Barrett the question of disputed titles, that has stood in the way of the camp's development, is about settled, and work is taking on a more vigorous aspect.

The large gold mill at El Tigre mine, a few miles south of the line, is starting up, and there are thousands of tons of rich rock on the dump, awaiting treatment. A cyanide mill will be installed later, and in the meantime all tailing will be stored.

The shaft at the Saginaw Development property is down within a few feet of the 700-ft. level, and a cross-cut is working out along a seam showing ledge and leached lime. The shaft itself is getting to water level, and the management expects that when this is reached there will be copper. This property is developing the ground held by the American company, and the latter will be organized as a development company in a short time. It is not probable that any of the American's stock will be outside present holders.

During the past four weeks the shaft at Shattuck-Arizona was driven down 130 ft., the best record for its size ever made in Arizona. It is going on down at the same speed and will be bottomed in the course of a few weeks.

Toronto. Feb. 10.

The estimates for Dominion public works now under consideration by Parliament include $200,000 for a Canadian mint building, the contract for which has already been let. The total cost will be about $375,000. Mr. Laurier in urging the adoption of the item on Feb. 6 stated that in view of the production of gold in the Yukon it had for some time been considered advisable to establish a mint to provide a market for the gold which had now to go to the United States. The Yukon had annually been producing $10,000,000

of gold, and the yield of all Canada was $20,000,000. The government had obtained permission of the Imperial authorities to coin money for them. While he did not think that as a commercial transaction there would be any money in it, yet it was desirable to have Canada represented abroad by her own coinage. The mint would make Canadian $1, $5, $10 and $20 pieces, as well as British gold coins. Trade would be brought to Canadian cities, where the gold would be marketed, instead of being taken across the line. The amount asked for was voted.

G. G. S. Lindsey, general manager, and D. Davies, comptroller, of the Crow's Nest Pass Coal Co., arrived in Toronto on Feb. 4 from British Columbia. Mr. Lindsey stated that there were now three mining centers for the company's operations: Coal creek, five miles from Fernie, Michel, and Carbonado, 12 miles south of Fernie, formerly known as Morrissey. At Fernie 1,128 coke ovens were in operation, turning out about 1,000 tons daily, of which about 700 tons were used in the Kootenay, the remainder being exported to the United States. The company was now able to keep the smelters of the Kootenays well supplied, which was not the case a few years ago, before its equipment was completed. The population of Fernie had increased rapidly and now numbered some 3,000, of whom two-thirds were miners. The company had latterly much less trouble in securing men than was formerly the case.

The new Canadian Pacific railway natural gas well at Medicine Hat, N. W. T., has been examined by W. T. Brooks, resident engineer of the company at Calgary, under whose direction the well was capped for 8 minutes, in which time a rock pressure of 455 pounds was developed. This shows the well to be a better proposition than the town's 1,000 ft. well, which yields 1,125,000 feet each 24 hours. The town council of Medicine Hat has decided to sink another 1,000 ft. well, to be held in reserve in case of accident to that in operation.

The Lake Superior Corporation has filed a claim at Ottawa for a bounty of $3 per ton on steel rails manufactured at Sault Ste. Marie, amounting to about $60,000. The bounty was granted on certain classes of steel used in structural work and was not supposed to apply to steel rails, which are protected by a duty of $7 per ton. The matter has been referred to A. B. Aylesworth, K. C., for a legal opinion.

The new administration of the Province of Ontario, under the leadership of James P. Whitney, has assumed office. J. J. Foy, of Toronto, becomes Commissioner of Crown Lands, but it is understood that he fills the position temporarily. It is announced that a Minister of Mines will be appointed later. In the meantime the Bureau of Mines continues as a branch of the Crown Lands Department, and it is hardly likely that any material changes in the provincial mining regulations will be made until it is put upon a permanent basis.

Prospecting for minerals in the northern portion of Quebec Province will be carried on actively during the coming season, both under government and private auspices. The Dominion geological survey will send out a party of prospectors and engineers early in March to examine the mineral deposits in the districts through which the Grand Trunk Pacific railway will pass. Peter McKenzie, president of the McKenzie Trading Co. and the Chibagamo Mining Co. will leave Montreal shortly in charge of a party of 30 prospectors for Chibagamo in the Mistassini district. They will go 180 miles north of Roberval by sled.

Victoria. Feb. 7.

Boundary.—Shipments of ore from high-grade silver-gold mines around Greenwood totalled 250 tons in January, as follows: From the E. P. U., 65 tons; Elghorn, 50 tons; Last Chance, 43 tons; Bay, 42 tons; Providence, 30 tons, and Skylark, 20 tons. The Providence also shipped 20 tons of second class ore. The Elkhorn ore is reported to have returned an average of $147 per ton net from the smelter. The general average value of the other shipments is placed at about $100 per ton. The Providence also shipped 20 tons of second grade ore valued at $25 per ton. The Last Chance has increased its working force to 14 men so as to maintain an average weekly output of 50 tons. Cross-cuts at the 300 and 400-ft. levels of the Providence have reached good ore, after passing through a dyke. The Strathmore will join the shippers shortly, and the Barbara, Helen, Coro-Canadian, Gold Bug and Combination may soon follow suit. Some 145 men are employed in the high grade mines and prospects here.

Slocan.—Silver-lead ore and concentrate shipments for January from 10 mines in the Slocan mining division totalled about 800 tons (more than half of which was from the Slocan Star and Reco mines), and zinc 157 tons. The latter does not include any zinc concentrate from the Slocan Star, which lately sold 2,500 tons, delivery of which has begun. In the Slocan City division, 301 tons of dry ore were sent to the smelters from five mines, the Black Prince being highest, with 131 tons, and the Ottawa next, with 110 tons.

The annual meeting of the Pioneer Mining Co., held recently at Nelson, was adjourned to early in March, when officers will be elected. This company last year consolidated the Two Friends, Bank of England and Black Prince groups, in the Slocan City division. The annual meeting of the Reco Mining & Milling Co. was held at Sandon last week. The profit and loss statement showed a credit balance of $39,701, of which amount $31,225 was net profit from last year's operations. A dividend of 2 cents per share on the 958,200 issued shares was declared, payable on Feb. 20. The directors for the ensuing year are J. M. Harris, Sandon, president and manager; S. M. Wharton, Spokane, vice-president; Fred. T. Kelly, Sandon, secretary-treasurer; J. G. Steele, Sandon, and G. C. Wharton, Mobile, Ala. Payment of this dividend will increase total of divided profits to $307,082.

Rossland.—Boring with a diamond drill is reported to have resulted in a new shoot of ore 17 ft. wide, being met with at an intermediate level of the Jumbo mine only a short distance from where the bore was commenced. A cross-cut is being driven to reach this ore, shipments of which will shortly be made.

Output for first five weeks of the year is about 32,000 tons, with seven mines shipping. Scarcity of water has necessitated the temporary closing down of the White Bear and Velvet-Portland mills.

The Rossland Board of Trade has adopted a resolution urging the provincial government to remove reserves now on land remaining unalienated originally withdrawn from sale or selection to allow railway companies to choose lands they were to be granted as subsidies for building railways. It is stated that there are 4,000,000 acres of such lands still held under reserve, and the throwing open of these lands is urged, especially those situated in sections where coal and oil are believed to exist, so that locators may secure title to lands of this class.

East Kootenay.—Notice has been served on the solicitors to the Crow's Nest Pass Coal Co. of abandonment of the appeal made on behalf of the plaintiffs in five suits against the company for damages claimed as having resulted from an explosion at the defendant company's Coal Creek colliery in May, 1902. More than 100 suits had been brought against the company, and of these five had been selected as test cases, the result of the consolidated trial of which was, after the evidence of English, Canadian and United States experts had been taken, a verdict in favor of the company. Notice of appeal to the Full Court was given by the plaintiffs' solicitors, but finally it was decided not to proceed with it, consequently litigation that extended over between two and three years is now at an end.

Revelstoke.—The Revelstoke & McCullough Creek Hydraulic Mining Co., much of the stock in which is held in Duluth, Minn., has everything in readiness for hydraulicking operations whenever the season shall open. The plant has been thoroughly overhauled and supplies sent in, so that no time need be lost in the spring making preparations for the season's work. The company's outlay in 1903 on plant, water supply and a small sawmill, totalled about $16,000, and last year there was a further expenditure. The fall in the creek is so rapid that a head of 275 ft. is obtained in a total distance from intake to penstock and thence to the giants of 1,380 ft. Prospect holes to bedrock, which is not deep, show coarse gold. A profitable run in the ensuing season is looked for with confidence.

Monterey. Feb. 7.

According to the *Diario Oficial*, the official organ, the Mexican government has authorized and amended the concession of the National Dynamite Explosive Co., so that on March 1, or on such date thereafter as the company is prepared to supply the Mexican markets with dynamite, the postponed duty on the same will be imposed at 22 cents per kilogram, or 1 cent Mexican per pound. During the life of the concession the duty shall not be reduced below 3 cents a kilogram, but the government shall indemnify the company in cash for the equivalent of the loss due to any reduction that may be made in the tariff. The rate on black powder (composed only of sulphur, charcoal and saltpetre) is not changed, nor is that for caps, fuse and such articles as are not manufactured by the company. The company may make any explosives deemed necessary for the needs of the country, but it is required to make and keep in stock for consumers five grades of dynamite, with 30, 40, 50, 60 and 70% nitroglycerine, or such other explosive of equal force as may be admitted by the government. These regulations apply to the factory at La Tinaja, Durango, near Torreon. At the National Powder Works at Santafé, the government will make for federal use a new explosive by improved methods with the recently installed machinery brought from Chaumond, France.

What may be done by an independent smelter, if it has sufficient mining property of its own, is shown by the results for 1904 of the Torreon Metallurgical Co., made public at its annual meeting. It was reported that the profits for the past year

amounted to $629,279 Mexican, or practically 18% on its capital of $3,500,000; and 201,612 tons of ore and flux were smelted. This is in addition to building two new furnaces. A dividend of 14% was declared on the stock with founders' bonds, and 12% on the other. The report further stated that there were 130,000 tons of high grade lead ore blocked out in the Cabrillas, near Saltillo; the San Diego, near Santa Barbara; Las Adargas, near Jibenez, and the Voladora, Azteca and Carbonato near Monterey. This company blew in its smelter three years ago with four 100-ton furnaces, and now has eight. It was voted to increase the capital by issuing $1,500,000 Mexican, 6% redeemable bonds, which it is believed have been already practically placed in London. The president was given authority to construct the copper furnaces and the necessary copper converters. This will be a new departure, as the company's agreement with the trust had been not to enter the copper market, which, with the independence of owning its own lead mines, placed it on amicable terms with the A. S. & R. Co. Now, though, as it has in contemplation the purchase of certain copper properties, it will be in a position to encroach on the copper preserves of the smelter trust. The officers elected were Eruesto Madero, of Monterey, president; Carlos Gonzalez, vice-president; Praxedis de la Peña, secretary, and P. Torres Saldaña, treasurer.

W. C. Greene has added to his mining holdings, which it is said have been increased in the last four months to the extent of $4,000,000 Mexican. The latest is the purchase from Gov. Enrique C. Creel, for the Greene Gold & Silver Mining Co., for $438,000 gold, of the Santa Juliana, comprising 46,000 acres in the Jesus Maria district of Chihuahua, 250 miles from the railroad. There is now a 20-stamp mill on the property which will at once be increased to an 100-stamp.

In Sonora it is reported that Geo. Woodward has sold to New York people the San Juan, near Moctezuma, for $1,000,000 gold. A 100-stamp mill is to be built at the Cerro Prieto, the Rey de Oro, 50 miles southeast of Magdalena, has been sold by W. R. Martin and associates to John E. McIntyre, though the terms are not given, and a 10-stamp mill is being completed on the Babaconora, adjoining the Chispas, and 14 miles south of Arizpe, and on which about 150 men are employed.

London. Feb. 4.

During the past three or four months we have heard a good deal in the City about a wonderful process for extracting gold from sea water. I have until now refrained from writing about it, because the JOURNAL is not the best medium for warning the innocent public against fake mining schemes. Such people do not read the JOURNAL, and, conversely, its regular readers should know enough not to be taken in with such propositions. This particular scheme has, however, assumed such alarming proportions and received the support of so many people eminent in science, mining, and finance, that the circumstances demand a plain statement of what is going forward. The daily press is full of the most ridiculous articles, and even the financial papers of the better class are only mildly sceptical.

Some months ago a city promoter, Mr. F. L. Rawson, noted for hare-brained schemes of all sorts, came across an inventor of the name of Snell, who had a secret process for precipitating gold from sea water. As the invention has not been patented, I cannot say officially what the precipitant is, but that is a mere detail. Mr. Rawson, as I have mentioned, is fond of wonderful schemes, and I think he really believes in them. Originally he was the moving spirit in a large firm of electrical contractors which came to an inglorious end ten years ago. Since that time he has turned his attention to a variety of schemes, such as flying machines, making fuel out of road sweepings, etc. On taking up this gold-from-sea-water process, he formed a company called the Industrial & Engineering Trust, Ltd., capital £3,000 in £1 shares. His first step on the road to success was to induce Mr. Frank Crisp, a member of the eminent firm of company lawyers, Ashurst, Morris, Crisp & Co., to take up some shares. After that excellent start other successes followed rapidly, and within a short time he was able to include among his shareholders the Marquis of Tweedale (a well-known chairman of companies), Lord Brassey, Mr. J. I. Thornycroft (builder of torpedo boats, etc.), Mr. Alban Gibbs (of Antony Gibbs & Sons), Major Coates (of the Stock Exchange), Mr. R. B. Martin (of Martin's Bank), Mr. W. Keswick (of Matheson & Co., and chairman of the Mountain Copper Co., Ltd.), Mr. Sandeman (formerly Governor of the Bank of England), Mr. Frank Taylor (of John Taylor & Sons), Mr. J. S. Sellon (of Johnson, Matthey & Co.), Mr. Stanley Christopherson (a director of the Consolidated Goldfields of South Africa), and Lord Rothschild. A truly wonderful list.

Experimental works were erected at St. Helen's, Isle of Wight, where concrete tanks were built in such a position that they could be filled and emptied by the tide. Sir William Ramsay was commissioned to go down and inspect the process. So far as can be seen from his report, he trusted entirely to the inventor, and to Mr. Rawson and his assistants for the facts and circumstances of the precipitation. All he did was to assay the precipitate. In his unsuspicion he endorsed the process, and his report was used for all it was worth. His deductions were that gold to the amount of one grain per ton of water could be precipitated, and that the process was such that the precipitation could be effected on a commercial scale. Since then it has been pointed out to him that he never assayed the original water and the tailing, so that he could not possibly tell how much water had yielded the precipitate he tested, nor what proportion of the gold in the water was recovered by the process. His subsequent experiments conducted privately (it is not likely that they will be published, at any rate, by Mr. Rawson) have shown that it is not possible to show that more than one-twentieth of a grain per ton exists in the sea water, even by the most elaborate assay. During this time the shares in the Industrial & Engineering Trust have been sold by Mr. Rawson for greatly enhanced figures, as much as £100 being obtained per £1 share.

The moral of this episode is not that there are always unscrupulous promoters, or that the most experienced people in the scientific and business worlds may be taken in by specious schemes. We know that already. The moral really is that, owing to the repeated use of gold-from-sea-water, for promotion purposes, some reliable investigations should be made with a view of placing on record the results of experiments in all parts of the world. The researches on the subject hitherto published are fragmentary and casual, and are not in a readily accessible form. I suggest that the Institution of Mining and Metallurgy or some other body should ask its members to undertake tests whenever opportunity offers and write contributions and discussions on the results obtained.

Johannesburg. Jan. 16.

Bret Harte's story about the 'wily Chinee' is no exaggeration, as we are beginning to find out. The ways some of them have of getting out of work, or getting the better of their bosses, are not only clever, but amusing. A certain percentage were 'born tired,' and no matter where you put them, they seem to do very little work. They do quite well at forging. It is the custom of the mines to pay the hammer men so much per inch drilled. One of these 'born tired' men never did more than 12 inches. Suddenly his ticket handed in at the office showed 72 inches. This record kept up for several days, until the head timekeeper discovered that the Chinaman had found out the art of changing a 1 into 7.

As a rule one has to be skeptical when a Chinaman in the mine tells you he is sick, and must go to the surface. One Chinaman desirous of getting up, made a slight cut on his face, and patched it up with court plaster. He looked a pitiful sight below, but the cruel light of day showed that he was feigning.

At first the number of Chinese who flocked to the hospital was embarrassing. A very tedious drill was instituted for convalescents, some violent medicine was given to the sick, the convalescent were given light work for a week, receiving no pay whatever. The percentage of sick dropped as mercury does before a blizzard, and now it is no exaggeration to say that very few Chinamen go to the hospital unless they are really ill.

Every one is jubilant over the December record, especially the Chinese advocates, who point with just pride to what their policy has done for South Africa already. Not only does the output for December constitute a record for the period since the war, but it brings the production for the past year to the highest total ever attained since the exploitation of gold in the Transvaal was taken in hand. Of course, every one expected a buoyant market in consequence of the output, but the market is as capricious as a child, and has not responded. The cause is no doubt due to financial troubles in connection with the Russian loan. There is bound to be a big boom yet, when it would be almost possible to float the whole Transvaal as gold mines.

People in this country seem to believe that two rotten eggs make a good one. A large gold mine, say A, is floated off and works for years, and finally closes down, a failure. Next to it is a mine, B, which also tries to pay expenses, but also closes down. The two mines lie dormant for a while. Then some big house comes along and announces the flotation of the "A and B Consolidated," with a capital of over £1,000,000. And in spite of past records, people rush to buy the shares.

Since the collapse of the Coronation syndicate boom, the Heidelberg district is under a heavy cloud. An outlet of the promoters had to be found somewhere, so they have moved almost bodily to the other extreme of the Rand, namely, to the Klerksdorp district. A good deal of work is being done there, many new ventures have been floated, or are about to be floated, and it is to be hoped that at least one good payable mine will be the result of all this work.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. George S. Gunn is in New York.

Mr. E. L. Dufourcq is at Santa Barbara, Mexico.

Mr. Godfrey D. Doveton is at Wedekind, Nevada.

Mr. C. M. Schwab is in Mexico on business relating to mining.

Mr. George I. Troop is at La Luz mine, in Guanajuato, Mexico.

Mr. W. L. Austin is examining the Granby mines, at Phœnix, B. C.

Mr. James V. Dignowity is making a tour of investigation in Mexico.

Mr. Henry F. Quint of Boston has been at Tonopah and Goldfield, Nevada.

Mr. Thomas W. Stiles has been examining properties in North Carolina.

Mr. Chester W. Purington has returned to Denver from Washington, D. C.

Mr. Maurice Lindeman, of De Lamar, Nev., visited Salt Lake City recently.

Mr. J. F. Flynn, of Parral, Mex., is recovering from a severe sprained ankle.

Mr. Harold C. E. Spence sailed on the *Lucania* Feb. 11 for London and Paris.

Mr. H. L. Griswold is superintendent of mines at the Union copper mines, in North Carolina.

Mr. J. A. Whitman, of the Oregon Hydraulic Mining Co., was recently in New York.

Mr. J. W. Bennie, manager for the Shannon Copper Co., at Clifton, Ariz., is in New York.

Mr. George E. Kiley has been making examinations near Middletown and Crown King, Arizona.

Mr. E. F. Ayton recently inspected the property of the Guanacevi Tunnel Co., at Guanacevi, Mexico.

Mr. J. E. Clennell, author of 'The Chemistry of Cyanide Solutions,' is at Benkulen, Sumatra.

Mr. Arthur E. Drucker is visiting the Montezuma mining district in the State of Sonora, Mexico.

Mr. C. W. Pritchett has returned to Denver from an absence of six weeks in southeastern Alaska.

Mr. M. M. Johnson, of Salt Lake City, is examining the Montreal & Boston mines, at Phœnix, B. C.

Mr. I. Wayne von Leer has been appointed manager for El Carmen mine, in the State of Durango, Mexico.

Mr. Frank Klepetko has been appointed consulting metallurgical engineer to the Douglas Copper Co., of Mexico.

Mr. Gustave M. Gouyard has been appointed consulting mining engineer to the Douglas Copper Co., of Mexico.

Mr. E. W. Sebben, who recently returned to Denver from the East, has gone to Nevada, on professional work.

Mr. George H. Dern, manager of the Consolidated Mercur mine, of Utah, has returned from a trip to California.

Mr. G. G. S. Lindsey, general manager for the Crow's Nest Pass Co., has arrived in Toronto, from British Columbia.

Mr. Frank Cochrane, of Sudbury, Ont., recently suffered the loss of his right leg in a railway accident, at Wahnapital, Canada.

Mr. Henry M. Crowther, manager of the Continental Alta mine, of Utah, has returned to Bingham from a trip to New York.

Mr. Ernest C. Wood has been appointed consulting engineer to the Essex Consolidated Mines Co., at Angel's Camp, California.

Mr. John B. Hobson, manager for the Consolidated Cariboo Hydraulic Mining Co., of British Columbia, has been visiting the East.

Mr. W. T. Frazier, superintendent for the Alder Creek Mining Co., at Flat Iron, S. D., is examining properties in the Southern Hills.

Mr. H. F. Wierum, formerly manager for the Colorado Smelting Co., is now manager at the Union copper mines, in North Carolina.

Mr. Thomas J. Ryder has resigned as general manager for the Waters-Pierce Oil Co., in Mexico, to devote his time to his personal interests.

Mr. W. S. Brooks has been examining the natural gas well of the Canadian Pacific railway, at Medicine Hat, Northwest Territory, Canada.

Mr. F. H. Probert returned recently from Sonora, Mex., to Los Angeles; but has left again for Globe, Ariz., to examine some copper properties there.

Mr. Joseph M. Knight, manager of the Leadville, Colo., *Herald Democrat*, and Leadville correspondent for the JOURNAL, has been visiting in New York.

Mr. Shirley Keeling has been appointed assistant supervisor in connection with claims for bounty on lead contained in lead-bearing ores mined in Canada.

Mr. Arthur A. Niedermeyer has been appointed general manager for the Power & Mining Machinery Co., of Cudahy, to succeed Mr. H. P. Elwell, who has resigned.

Mr. J. H. McCormick, for the past two years superintendent for the Gold Reef Mining Co., at Giltedge, Mont., has resigned his position and will go to Goldfield, Nevada.

Mr. W. A. Prichard has resigned the position he has held for some time with Bewick, Moreing & Co., in Western Australia, and will leave Australia for London early in March.

Mr. James C. McCoy, recently superintendent for the Raritan Copper Co., of New Jersey, expects to leave soon for Peru, where he will superintend the construction of a smelter.

Mr. Robert T. Hill, Professor E. O. Hovey and Mr. John Seward have gone to Mexico, where they will make extensive examinations in the western Sierra Madre and the State of Sonora.

Mr. Rudulfo Fittig, technical manager for the Fabrico de Acumulatores, has returned to Mexico City from Mapimi, where he has installed a storage battery for the Peñoles Mining Co., of that place.

Mr. Arthur H. Brown has resigned from the employ of the Consolidated Mercur Company of Utah to become superintendent of the Kittie Burton Company's mines in the Salmon River district of Idaho.

Mr. Claude L. Caujot has resigned as engineer for the mining interests of Kountze Brothers in West Virginia and Kentucky, and has established an office as civil and mining engineer at Williamson, West Virginia.

Mr. Carl R. Davis has resigned as superintendent of the Centre Star and War Eagle mines at Rossland, B. C., to undertake the management of the Lancaster mines at Krugersdorp, South Africa. He will sail about March 1.

Obituary.

William W. Braddon, a member of the editorial staff of the *Iron Age* and the *Metal Worker*, died suddenly Feb. 12, aged 49 years.

George J. Barrett, who was extensively interested in mining in Oregon, and superintendent of the Blue Bird mine at Granite, died from pneumonia, Jan. 30, at Granite, Oregon.

Harry W. Beale, superintendent of the Valley and Beale coal works, at Leechburg, Pa., was struck by a locomotive engine and killed at Leechburg, on Feb. 4. He was 38 years of age.

William Skinner, a mine manager at Parral, Mexico, was killed by a fall on Feb. 3. He was 52 years of age and had for 12 years been prominently connected with various mines in Mexico.

Casimir Constable, of Constableville, N. Y., died Feb. 7, of typhoid fever, in his 60th year, in New York City. Mr. Constable in his youth was a mining engineer of wide reputation, but when 35 years old gave up active practice of his profession.

George Bauer, a banker and mine-owner, of Mancos, Colo., died at Guadalajara, Mex., Feb. 1, aged 57 years. Mr. Bauer developed the mines now owned by James Doyle, and at the time of his death owned principal interests in the Comstock mine on the La Plata river, and a number of prospects in the same district. Mr. Bauer was known and respected throughout the entire State.

Antonio Garcia Parreño, a chemical engineer of high repute, and was well known as an analytical chemist throughout Spain, died at Cartagena Jan. 27. During his long career of over 40 years he wrote and published several works on chemistry of considerable scientific interest.

Societies and Technical Schools.

Worcester Polytechnic Institute.—The annual catalogue of this institution gives attotal enrollment of 325 students in all departments.

Colorado School of Mines.—The institution has made provision for a secondary technical course for miners, mill foremen and metallurgical assistants.

Montana Society of Engineers.—At the 18th annual meeting of this society at Butte, Jan. 13 and 14, the following officers were elected: Ernest W. King, president; Bertram H. Dunshee, first vice-president; Edward C. Kinney, second vice-president; Clinton H. Moore, secretary and librarian; Samuel Barker, Jr., treasurer; Robert A. McArthur, trustee.

Pike's Peak Polytechnic Society.—This society, composed of civil engineers and surveyors, mining engineers, mechanical engineers, electrical engineers, architects, irrigation and forestry engineers, geologists, assayers, chemists and others who are studying or practicing along technical lines, has been formed in Colorado Springs. Its object is the promotion of intercourse, observation and records in technical subjects, by means of periodical meetings, reading of papers, discussions, special investigation into matters of public and technical interest, the publication of such parts of the proceedings as should be deemed expedient. The officers are: President, William Strieby; vice-presidents, B. H. Bryant, L. E. Curtis, W. F. Douglas; recording secretary, E. A. Sawyer; corresponding secretary, W. D. Waltman; treasurer, Ira A. Miller.

Trade Catalogues.

The National Wire Corporation is sending out a circular which describes its extra double galvanized strand rope.

The Edson Manufacturing Co., of Boston, Mass., is sending out a unique card, calling attention to the Edson pumps, steering gears, wheels and bottle fillers.

A booklet, describing the Vaughn automatic mill roller process, has been prepared by R. A. Vaughn, of Ballard, Wash., who has applied for a patent on this process.

'Graphite' for February, issued by the Joseph Dixon Crucible Co., of Jersey City, N. J., contains the usual interesting matter concerning the graphite products of the company.

A convenient price-list and catalogue has been prepared by the Laclede Fire Brick Manufacturing Co., of St. Louis, makers of all kinds of vitrified brick, fire brick and blocks for street paving.

Bulletin A, a handsome booklet issued by the Jeffrey Manufacturing Co., of Columbus, O., is devoted to a description of the Scioto Valley Traction Co.'s power plant at Reese's Station, Ohio, which is equipped with buckets made by this company.

The Murray Iron Works Co., of Burlington, Ia., has prepared four books of fac-simile letters from its customers. They form a collection of spontaneous expressions of approval from those who have used this company's machinery with satisfactory results.

Publication No. 117, of the Allis-Chalmers Co., of Milwaukee, Wis., is entitled 'Gates Rock and Ore Breakers, Styles D & F.' There is much valuable information concerning these well-known breakers, and the catalogue is prepared with a taste which characterizes the publications of this company.

Industrial.

The 24 Wilfley tables and 6 Wilfley slimers, recently ordered for the El Cobre mines, at Santiago de Cuba, have been shipped by the Traylor Engineering Co., of New York.

The chemical manufacturing firm of E. R. Squibb & Sons, of New York, has recently been incornorated with the following officers: President, Theodore Weicker; chairman of the board of directors, Dr. Edward H. Squibb; Charles F. Squibb, Lowell M. Palmer, Herman G. Weicker, William M. Spackman and Edward M. Shepard. The capitalization is $1,100,000, of which $350,000 is preferred stock.

The annual meeting of the H. W. Johns-Manville Co. was held in the company's offices in New York on Jan. 16, and the following officers elected: J. G. Cannon, chairman of board of directors; T. F. Manville, president; C. B. Manville, vice-president; Chas. Hathaway, vice-president; G. W. Gladwin, vice-president and treasurer; H. E. Manville, secretary. The directors are the officers and H. W. Johns, Wm. H. Porter and C. R. Manville.

The S. H. Supply Co., of Denver, has the contract for furnishing all of the material for a 250-ton copper smelting plant at Kelvin, Ariz., for the Saddle-Mountain Mining Co. This equipment consists of a 36 by 140 copper matting furnace of the latest type, No. 7 Connersville blower, boilers, engines, pumps, 125 ft. steel self-supporting stack, steel dust chambers, slag pots, etc. The entire shipment is to be made in less than 30 days and consists of over 200 tons of material.

The Westinghouse Electric & Manufacturing Co. has sold to the International Paper Co., for use in its plant at Berlin, N. H., one 250 kw. alternating current generator of the revolving armature type, three 40-h.p. alternating current motors, with switchboard, transformers, etc. The Westinghouse company has a number of commercial engineers who give special attention to such installations, and has installed a large number of equipments for the electrical operation of paper and pulp machinery.

The annual convention of officers and branch managers of the Crocker-Wheeler Co. took place at the main office and works, Ampere, N. J., Jan. 26, 27 and 28. Managers and representatives were in attendance from all parts of the country, and were unanimous in predicting a prosperous season during the coming year in the field of alternating current generators and direct current generators and motors.

Following is a list of "Hornsby-Akroyd" oil engines recently installed or being constructed by the De La Vergne Machine Co., of New York: United States navy department wireless telegraph station, two 50 h.p.; Indianapolis Pipe Line Co., Geneva, Ind., one 32 h.p.; Ohio Oil Co., Findlay, Ohio, one 25 h.p.; C. M. Holbrook, Oil City, Pa., two 32 h.p.; the Charles Mills Supply Co., New York City, one 13 h.p. and one 7 h.p.; E. C. Bumiller, Iquique, Chile, two 4 h.p.; Thirteenth Regiment Armory, Brooklyn, N. Y., one 20 h.p.; Honolulu Iron Works, one 32 h.p.; Balbach Smelting & Refining Co., Newark, N. J., one 50 h.p.; C. E. Hewitt & Co., New York City, one 125 h.p.; Boston light-house department, two 4 h.p.; Bristol Electric Light Co., Bristol, N. H., one 50 h.p.; Armour Car Lines, Chicago, Ill., two 125 h.p.; Thos. Stephens & Sons, Ltd., Albany, N. Y., one 16 h.p.; Remington Machine Co., Wilmington, Del., one 1½ h.p.; lighthouse department, Tompkinsville, S. I., two 13 h.p.; light-house department, Milwaukee, Wis., four 16 h.p., and the Andrews-Doron Co., Los Angeles, Cal., one 50 h.p. and two 125 h.p.

The International Committee of the Louisiana Purchase Exposition has recognized the engineering ability of the designers of the apparatus exhibited by the General Electric Company, in awarding grand prizes as follows: To Elihu Thomson, Swampscott, Mass., for various applications of electricity; also to C. P. Steinmetz, Schenectady, N. Y., for electric lighting, and to F. J. Sprague, New York City, for application of electricity to transportation. They have also awarded gold medals to C. G. Curtis, of New York City, "the originator of a successful American multi-stage steam turbine;" to W. L. R. Emmett, of Schenectady, N. Y., "designer of the vertical type of Curtis steam turbine and generator;" and to W. B. Potter, Schenectady, N. Y., for applications of electricity to transportation. They have also awarded silver medals to W. S. Moody, Schenectady, N. Y., for transformers; to E. M. Hewlett, Schenectady, N. Y., for distribution of energy, switchboards, etc.; to H. F. T. Erben, Schenectady, N. Y., for apparatus for generating electricity; to H. G. Reist, Schenectady, N. Y., for apparatus for generating electricity; to L. T. Robinson, Schenectady, for scientific apparatus, measuring apparatus and laboratory and standard instruments, and to F. P. Cox, Lynn, Mass., for measuring instruments, indicating, recording and integrating.

General Mining News.

ALABAMA.

JEFFERSON COUNTY.

Tennessee Coal, Iron & Railroad Co.—A fire is raging in the Belle Sumyer coal mnies of this company at Birmingham. It is not known whether any miners are in the mine.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—The directors had before them at a recent meeting the results for the year ended Sept. 30, 1904, subject to final audit. After carrying to reserve a sum of £40,000 for redemption of debt, replacement of capital outlay, etc., the surplus, including £14,863, brought forward from 1903 is £262,801. After deducting the preferential dividends, amounting to £24,531, a sum of £238,270 is left. The directors have resolved to recommend to the annual meeting to be held Feb. 20 the payment out of this sum of a dividend for the year of 3s. per share, free of tax, on the preferred ordinary and deferred ordinary shares of 5s. each. To account of this dividend 1s. 5d. per share was paid July 27 last, and it is proposed that the balance of 1s. 7d. per share be paid on Feb. 23. The dividend for the year of 3s. per share absorbs £227,984, and the balance of £10,286 will be carried forward. The production of copper for the month of January was equivalent to 688 tons of 2,000 lb. each. The production was interfered with by a severe flood in the river at Clifton about Jan. 11, but on Jan. 24 the plant was again in full operation.

CALIFORNIA.

CALAVERAS COUNTY.

Kennedy Mining & Milling Co.—At this mine, Jackson, they are about to open up a level at the depth of 2,650 feet.

South Eureka Mining Co.—The new mill of this mine, Sutter creek, is crushing 100 tons of ore per day, the ore coming from the 2,400-ft. level. About three tons of sulphurets are being saved daily.

Wildman-Mahoney Mining Co.—Twenty stamps are dropping or ore from the 1,400-ft. level of the Wildman, at Sutter creek, John Ross, Jr., superintendent.

Zeila Mining Co.—In this mine, Jackson, they are cutting a station at 1,500-ft. level, and drifting also toward the ledge on the 1,400-ft. level.

Benson Mining Co.—John Benson, manager of this mine at Angels, states that they have come unexpectedly on a new and large ledge of a good grade of milling ore. Additional machinery has been ordered. The new 10-stamp mill has been started up.

Essex Consolidated Mines Co.—F. R. Crooks, superintendent of this property (Jones and Allison mines) has cleaned out and repaired the 11-mile ditch, and put in new flumes. The shaft has been unwatered to a depth of 200 ft. The machinery has been overhauled and repaired.

Johnson.—Work has been commenced on this property under the superintendence of J. B. Luddy. A shaft is to be sunk 300 ft. through the gravel when crosscuts will be run.

Pilot.—At this mine near Cave City the 14-stamp mill has been started up on good ore.

"49".—At this property, Douglas Flat, excellent gravel is being mined from a large body.

EL DORADO COUNTY.

New Highland Gold & Copper Co.—It is reported that J. A. Parker, manager of this property, is making arrangements to start work again.

NEVADA COUNTY.

Idaho-Maryland Mining Co.—The shaft at this property, Grass Valley, has now been re-timbered down to the 400 ft. level. The water has been pumped out to a short distance below this. The mill has all been overhauled.

North Star Mining Co.—The new cyanide plant at this property at Grass Valley, A. D. Foote, superintendent, is nearly completed. A Chilean mill will reduce the coarse sulphurets.

Spanish Ridge.—This mine near Washington has added 10 stamps to its mill and now has 20 stamps. The property is worked by tunnel and open cut. The ledge is very wide.

PLACER COUNTY.

Gravel.—This gravel mine at Bowman, which was partially hydraulicked some years ago by John B. Hobson, is being mined by O. L. Turfrey, who is running a tunnel into the gravel hill, and is trying to reach the bottom of the crevice.

Polar Star.—This gravel mine at Dutch Flat, owned by Wm. Nichols, Jr., has been leased to a San Francisco company, with Wm. Simmons as superintendent, and a large force of men is at work night and day.

PLUMAS COUNTY.

Claybank.—Blue gravel has been struck in this mine near La Porte, about three feet above the roof of the tunnel. This is supposed to be on the southerly end of the famous Gibsonville channel profitably worked for many years and notably by the Bellevue (Thistle shaft) on the Sierra county side, where they have found gravel yielding an ounce to the mine carload.

SHASTA COUNTY.

Mammoth Copper Co.—This company is employing 150 men and 25 teams on its smelter site at Kennett. Some of the machinery has arrived from the East.

SIERRA COUNTY.

Dolly Varden.—At this mine pumping machinery has been put up and the old shaft, where the rich pockt was found, has been pumped out.

SISKIYOU COUNTY.

Red Hill Quartz.—J. O. Jilson, superintendent of the Hazel Mining Co., has put three shifts of miners on this mine at Canal Gulch, near Yreka. It has also started up the mill near Hornbrook.

Yreka Creek Dredger.—Captain Winters has 25 men overhauling and rebuilding this machine so that it may be operated by electricity instead of steam. Payments have been made on the bonded ground near Hawkinsville.

TRINITY COUNTY.

Enterprise.—Mark Manley, superintendent of this mine, near Helena, has had it under working bond for over a year and has made final payment, indicating that the development and prospecting work has been satisfactory. This mine is equipped with a 10-stamp mill, hoist and other machinery. The working force is to be increased at once.

TUOLUMNE COUNTY.

Brindle Pup.—A company headed by G. Weinbaum is now operating this mine and machinery is being installed.

Hunter.—This mine has been bonded to Eastern men and work is to be commenced at once.

Viola.—This mine is under bond to Eastern men and the work of equipping it is to start at once.

Moody.—This mine, at Big Oak Flat, has closed down on account of the high price of wood, and will not resume operations until the roads become good.

Mountain Lily.—H. M. Heath and C. G. Grim, lessees of this mine, have struck a blind vein in the tunnel they are running and have been taking out very rich "candle box" ore.

Densmore.—This mine is shortly to be reopened by local capital.

COLORADO.

BOULDER COUNTY.

Banner Development Co. — Colorado Springs parties have organized this company and purchased the Morgan and Lumley properties on Trail creek, consisting of 18 patented claims. A complete development of the group will be carried out by sinking the main shaft and extending the crosscut tunnel, and surface ground will be leased in blocks.

Monarch Consolidated Gold & Copper Mining & Smelting Co.—This company owns mining property near Sunshine, as well as in Grand county. It has installed good plant of machinery and erected suitable top buildings, has developed ore bodies in the Pilot claim and is shipping a car of ore every week, smelting ores carrying values of from $20 to $38, while the mill ores carry values of $10 and up per ton. The company is figuring on the installation of a complete electric water-power plant, and will develop the property with tunnel workings so as to get depth. It intends to install an aerial tramway between mines and its contemplated mill of 100 tons daily capacity. The main office of company is at Boulder. Cobers were 264 cars, or 5,270 tons, a gain of over 130 per cent of the same month for the previous year.

CLEAR CREEK COUNTY.

January Ore Shipments. — The shipments of smelting ore and concentrate from the Idaho Springs depot of the Colorado & Southern road to Denver and Golden smelters were 264 cars or 5,270 tons, a gain of over 130 per cent. of the same month for the previous year.

Beaver.—Sinking operations are being carried on at this property on Chicago creek, and shaft will soon be 400 ft. deep. Ores running from $50 to $300 have been taken out, but no effort is being made at large production until more depth is obtained. J. J. Hoban, Idaho Springs, is manager.

Vidler Tunnel.—English capital is reported to be interested in this large tunnel scheme near Georgetown; large outbuildings are soon to be erected and a heavy plant of machinery is to be installed before summer. Work is proceeding rapidly with hand drills, but machine drills will put the tunnel in at the rate of 100 ft. per month. L. W. Vidler, Georgetown, Col., is manager.

GILPIN COUNTY.

January Ore Shipments.—The shipments of smelting and crude ores, tailing and concentrate shipped to Denver and Golden smelters and to outside points of treatment, were 300 cars or 6,250 tons, this being the second heaviest shipping for more than 12 months and being in excess of the corresponding month for last year of 106 cars or 2,370 tons, a pain of over 60%. Developed properties and new strikes of recent date point to the continuance of increased shipments for 1905.

El Dorado.—Local parties under a lease recently took hold of this idle property, and after doing dead work opened up about four feet of low-grade pyritic iron, which this week has changed into colverite, carrying values as high at 52% in copper, together with gold and silver, making a value of $118 per ton, and it promises to be a first-class find.

Gower Mines Syndicate, Ltd.—An order has been placed with the Rand Drill Co. for a six-drill air compressor, which will be used for sinking the Running Lode shaft, where the ground is unusually tight and hard. The property is the best dividend payer in the county, last year paying dividends of over $100,000. T. Dunstone, Black Hawk, Colo., is superintendent.

Imperial Mining & Milling Co.—Kansas City and Marshall, Mo., and Indianapolis, Ind., parties are interested in the Mackey mine in Pine Creek district, where a rich strike is recorded. nI the 150-ft. level a four-foot orebody has been opened up for a length of 30 ft., carrying average values of eight ounces gold, 18% copper and 25 oz. silver, or over $200 per ton, the rich streak carrying values of 60 oz. gold, 25% copper and 40 oz. silver up to $1,600 per ton. A carload shipment of 25 tons expected to run betterthan $200 per ton is being made to Denver smelters. From two to three cars of ore running net from $18 to $22 per ton are being shipped weekly.

JEFFERSON COUNTY.

Bear Creek. — Considerable gold and copper mining is being carried out in the Morrison and Evergreen sections, and there is a report that a plant will be erected during the spring months for the treatment of these ores. The F. M. D. mine has recently installed machinery and erected substantial buildings, has a main shaft down nearly 200 ft. and the ore in the shaft is reported to give an average value of 14 per cent. in copper and $5.00 in gold per ton. Bernard McCaffrey, Denver, is the principal owner of the property. The Despatch Copper-Gold Mining Co. is on Bear creek, and recently it has installed new machinery and contemplate erecting larger buildings.

LAKE COUNTY—LEADVILLE.

Seven claims, comprising the Parsons, Cute, McGregor, Bates, Little Sister and Mike have been sold to an English syndicate by the owner, F. W. Owers, for $4,500,000. These properties are on lower Rock Hill, about 2½ miles from the Arkansas river. They have been developed only by drill-holes but have given indications of great richness. This is the largest deal consummated in Leadville in many years.

SUMMIT COUNTY.

A carload shipment by lessees from the Germania, netted over $75 per ton. A six-foot body of iron and copper-sulphide ore is reported as a find in the Senator tunnel, of which 18 inches carries values of $50 per ton, the balance being suitable for concentrating. A 50-ton test lot of zinc is being taken out of the Silver Wing mine near Montezuma by the Mine Smelter Co. of Denver. Arrangements are being made with the Gold Pan company to furnish electricity for the sampling works at Breckenridge. About 40 tons per day of lead ores are being shipped from the properties of the Colorado-Wyoming Development company on Mineral Hill, of a medium grade, and a sample

car of 25 tons of zinc ores were shipped this week to the American Zinc & Chemical Co. of Denver. Even at this early season, considerable preparatory work is being performed, with a view to the most extensive placer mining year in the history of Summit county.

Beaver Creek Gold Mining Co.—Chicago, Columbus and Mount Vernon, Ohio, and Pittsburg, Pa., parties are interested in this company and in the purchase of the Mineral Belt and Lucky groups of mines near Breckenridge. F. A. Yauger, Breckenridge, Colo., is manager, and heavy plans are being formed.

TELLER COUNTY—CRIPPLE CREEK.

Portland Gold Mining Co.—The annual meeting of the stockholders of this company was held this week at Council Bluffs, Ia. The following directors were elected for the ensuing year: Irving Howbert, F. G. Peck, D. H. Rice, Carl Chamberlain and Thomas F. Burns. A strenuous fight between the two factions of the stockholders has been waged for some time past, resulting in the overthrow of James F. Burns, who for years has been president of this company. Mr. Burns has always dictated the policies of the company until recently, during the labor troubles, when the directors interfered with Mr. Burns' management with regard to union labor. The meeting was quite a stormy one and resulted in the complete overthrow of Mr. Burns, who was not even placed on the board of directors. Had Mr. Burns controlled the election, it would probably have made considerable difference as to the attitude of the Portland management toward union labor, and would in all probability have caused some trouble in labor circles. The reports of the officers of the company show the mine to be in splendid physical condition. Mr. Howbert was later chosen president of the board of directors, and as the present management at the mine are understood to be in sympathy with Mr. Howbert's ideas, no change will probably be made in the working force.

Forest Queen.—The application of Mr. Thomas Murray for a receiver on this property was denied to-day by Judge Seeds, for the present at least. A number of mining men have recently visited the property, and from the testimony introduced at the hearing it looks as though there was a large mine in prospect. The property is situated on Ironclad Hill, and adjoins the famous W. P. H.

ILLINOIS.

COOK COUNTY.

Peabody Coal Co.—This company of Chicago has certified to an increase of capital stock from $120,000 to $2,500,000, and has taken over the following companies: Busse-Reynolds Coal Co., Southern Illinois Coal Mining & Washing Co., Marion District Coal Association, Brazil Coal Co., City Fuel Co., Evanston Elevator & Coal Co., Brignall Brothers Coal Co., of Evanston, and Job's Ohio Hocking Coal Co.

INDIANA.

Official announcement is made that the Deering Coal Company, recently formed, has made a contract with the United States Steel Corporation to furnish bituminous coal to its mills in Indiana and other States for a period of fifty years. The company has taken over extensive coal properties in Indiana, principally along the line of the Chicago & Eastern Illinois railroad. It has an authorized issue of $5,000,000 bonds and an equal amount of stock. Of the bonds, $4,000,000 have been sold. The bonds carry 50 per cent. in stock as a bonus.

Jacob C. Kolsom, president of the Indiana Operators' Association, says: "Not in 15 years has coal been sold at the mines in Indiana as at low price as at present. There is no agreed price at the mines. Every operator is offering coal just a shade lower to make a sale from week to week." Inquiry among mine operators showed that coal is selling from 50 to 60 cents less a ton than last April. Coal has been sold below cost in several instances. What is true of the bituminous coal has been true of block, the Clay county product. The older operators look for liquidation in the mining industry. It is predicted that with the completion of the yearly contracts in April some of the new operators will go out of the business.

A bill for an act to compel the registration of all mining companies that do business in Indiana, but have no property in the State, has been introduced in the Legislature. The certificate filed with the Secretary of State must show the financial condition of the corporation, the location of the property, with the plans of the same and the work done, the amount of cash expended in improvements, and the condition of the plants and machinery, if there is any. The penalty is a fine of not more than $100 for each violation

The Lalla creek coal mine in Sullivan county, near Jasonville, hoisted 56 flats of coal on Feb. 7. This is said to be the best record of any mine in the State.

NEVADA.

NYE COUNTY.

Tonopah Extension.—A 100-ton crusher is to be installed on this property at Tonopah. This will enable the mine to make larger shipments. At present they are about three cars a day.

NORTH CAROLINA.

ROWAN COUNTY.

Union.—This copper mine has a new manager in H. F. Wierum, formerly manager of the Colorado Smelting Co., Pueblo, Colo. His superintendent at the mines is H. L. Griswold.

Gold Hill.—These copper mines are in operation and producing a good grade of ore from the 800-ft. level. The main shaft is being sunk below this level.

PENNSYLVANIA.

ANTHRACITE COAL.

From the report of the inspector of the third district, the following figures are taken: Total production for 1904, 4,380,324 tons. Shipped to market, 3,889,676 tons. Persons employed, 9,720. Fatal, 36. During the year 30 mines were in operation.

BITUMINOUS COAL.

Westmoreland Coal Co.—This company has purchased control of the Penn Gas Coal Co., and thus becomes the largest gas coal producing company in the State. With the Penn company's 5,000 acres, the Westmoreland organization now controls more than 20,000 acres of gas-producing coal lands in Westmoreland county. Stockholders of the Penn Gas Coal Co. will receive $100 a share for their holdings. There is $1,500,000 of the stock, and the par value is $50. To pay for the stock the Westmoreland company will increase its capital from $3,000,000 to $5,000,000. The management has made plans also to borrow $1,000,000, and this will be used in making improvements to the Penn property. Gas coal stock is worth about 20 per cent. more than bituminous coal stock.

UTAH.

BEAVER COUNTY.

Frisco Contact.—The new hoisting plant ordered for this property is being installed.

Newhouse Mill.—The power plant has been warmed up and the work of filling the ore bins has commenced.

BOX ELDER COUNTY.

Century.—This mine is being operated with a force of about 10 men, who are devoting their attention to development. The mill has been closed down and will remain so until enough ore is developed again to warrant placing it in commission. The management made the mistake of not having kept development in pace with extraction.

JUAB COUNTY.

Scranton.—Sixteen men are now working in this property in North Tintic, which is shipping several cars of ore each week.

Star Consolidated.—Important developments are reported as having been made between the 600 and 700-ft. levels of this property, the ore running well in copper.

Undine.—Leasers working in this property have uncovered a good body of ore. The property in the past has produced a considerable amount of ore.

SALT LAKE COUNTY.

Continental Alta.—The last of the equipment for the 5-mile tramway which is to connect the mine with the mill recently completed, has arrived. The severe storms of the past few days may retard the completion of the system.

Fortuna.—Connections have been made between the cross-cut from the old Keystone tunnel with the Mayflower shaft. This is an important piece of development, and as soon as the old shaft is repaired shipments will be inaugurated from a virgin territory, where some extensive bodies of high-grade ore have been developed. The Mayflower was among Bingham's earliest shippers.

SUMMIT COUNTY.

American Flag.—This mine contributed 135 tons of ore to the markets this week, the controls showing values of 65.5 oz. in silver, $7.60 in gold and 5.5% lead.

Daly.—Work has been suspended temporarily in the Federal tunnel, which is being run to make connection with the Mazzepa shaft. The driving of the Ontario drain tunnel across the property towards the ground of the Daly-West Mining Co. has encountered some ore. A fissure cut this week is reported to carry high silver values and may develop into a very important find.

Scottish Chief.—Owing to the breakage on the hoisting plant this property has been closed. Repairs cannot be made immediately on account of the roads, which are blocked with snow.

Mount Masonic.—This is a new Park City property, which gives promise of making a good producer. A tunnel driven for a distance of 625 ft. has encountered a contact vein 4 ft. in width and at a vertical depth of over 400 ft. Selected samples assayed 400 oz. in silver and 14% lead. George M. Hasson, of Park City, is superintendent.

TOOELE COUNTY.

Black Diamond.—This company marketed a shipment of concentrate this week, made from ore run through the Honerine mill.

Honerine Mill.—This plant has been closed down temporarily, until connections are made between the main shaft and the drain tunnel, which will be made before the end of the present month.

Overland.—This property, at Sunshine, is operating a good force of men in the mine and mill, and is said to be making some money. The ore is of a very low grade and must be handled with the greatest economy to pay at all. Cyanide is the method of treatment employed.

WASHINGTON.

FERRY COUNTY.

Belcher.—The cross-cut from the lower tunnel level is in 41 ft. and entirely in copper ore of shipping quality, some of which is as good as any ever found in this region.

Copper Key.—The new tunnel, to tap the vein 230 ft. below the present stoping ground, is in 10 ft. The construction of a tramway from the tunnel to the railway sidings at Lambert, a distance of six or eight miles, is under consideration. A good grade can be secured, but the necessity for several bends around the sloping hills will call for careful engineering.

Mountain Boy.—The winze is down 90 ft. Drifts are being driven both ways on the ore shoot on the 80-ft. level. The lower tunnel is in over 300 ft. A drift is to be started eastward, to run 50 ft., from which point an upraise will be started, at an angle of 60°, to connect with the upper workings, for drainage.

Mountain Lion.—It is reported that a contract for a long period has been signed for the shipment of ore to the Granby smelter, at Grand Forks, B. C., and that a number of men will begin stoping immediately.

Quilp.—A carload a day will be shipped over the Republic & Kettle River railway to the Granby smelter. The first car was sent out Jan. 31, after a close down of several months.

OKANOGAN COUNTY.

Copper World Extension Co.—This company has sunk a large shaft to the 100 ft. level and is ready to drift. The mine is temporarily shut down at present. Twenty tons of machinery for the company will arrive at Republic about Feb. 20. It is expected upon its delivery that work will be resumed with a large force of men.

Douglass Mountain Gold Mining & Tunnel Co.—This company owns fourteen claims on Douglass mountain, two and one-half miles south of Loomis. It began operations Oct. 1, 1904. A tunnel is being run to tap a parallel ledge, which is disclosed on surface 200 ft. from the tunnel entrance, and shows a width of eight feet; 500 ft. farther the vein is again exposed, and at this point the width is 14 ft. This ledge runs in a general northwesterly and southeasterly direction. Eight other ledges with widths varying from one to six feet, running in a general easterly and westerly direction, cross the main ledge at various distances. On the Eldorado claim a shaft has been sunk 25 ft. and the ore shows high values. A shaft 20 ft. deep has been sunk on the Blue Jay claim, and a drift of equal distance discloses good values in gold. Work is now being centered on the tunnel, which will develop the entire group, which is now in the mountain 125 ft. The formation in which work is being done is granite. For the last 50 ft. this rock has been heavily mineralized, and many small quartz stringers are being encountered at intervals.

Grand View Mining Co.—This company is operating on Mount Chapaca, about six miles from Loomis, and having exposed a large amout of ore finds it necessary for more rapid and economical mining to apply power. A flume along the south bank of Cecile creek, 2½ miles south of Loomis, has been constructed, and everything is in readiness for installing an electric plant. This company is also putting up a 20-stamp mill for reducing ore, and with the installation of their electric plant will energetically push operations.

Judge Mining Co.—A company organized in Columbus, Ohio, has purchased the Leadville group of claims on Palmer mountain, near Loomis, for $30,000, and has incorported under this name, with a capital stock of 2,000,000 shares of $1.00 par value stock, of which 1,400,000 shares is treasury stock. Much development work has been done on these claims, and the new owners announce that in a short time they will begin active operations on an extensive scale.

Lone Pine Gold Mining Co.—This company owns six claims on Kruger mountain, extending from near the Similkameen river to the international boundary line. Surface croppings and many shafts and open cuts indicate the existence of a large ledge, and the company has begun systematic development of the property by commencing work on a tunnel which will cross cut this ledge. The ledge at the point where it will be encountered shows a heavy iron capping which carries fair values in gold, silver and copper. The ledge proper from numerous assays is shown to carry values from $14 to $95 per ton in gold, silver, copper and lead.

Palmer Mountain Tunnel Co.—This company has run a double track tunnel in Palmer mountain, and has cross cut numerous ledges. It is now installing an electric plant and reducing works. The water of Toats Coulee creek will be utilized for power, and as this stream has a rapid descent and large flow, abundant power can be produced.

Sinlahekin Gold Mining Co.—This company owns ten claims on Douglass mountain, six miles south of Loomis. A tunnel is being run to cross cut a 4-foot vein shown on its St. Paul claim. The tunnel has now been run 90 ft. and has passed the point on surface where ledge is visible. The rock is strongly mineralized and shows unmistakable evidences of copper values.

Foreign Mining News.

AFRICA.

NATAL.

The Mines Department of Natal reports the production of coal in the colony for November at 72,774 tons, an increase of 8,434 tons over November, 1903. The coal exported for the month was 3,571 tons, and 34,275 tons were sold to steamers in the port of Durban.

RHODESIA.

The gold output in December is reported by the Rhodesian Chamber of Mines at 28,100 oz. bullion, the largest figure ever reached. For the full year the total was 267,736 oz. bullion against 231,873 oz. in 1903, an increase of 35,863 oz., or 15.5%. The bullion reported in 1904 was equal to 238,285 oz. fine gold, or $4,925,351 in value.

AUSTRALIA.

WESTERN AUSTRALIA.

The gold production for the month of January is reported 165,572 oz. fine gold, the Mines Department having begun this year to report in fine ounces instead of bullion, as heretofore. In January, 1904, the output was 211,373 oz. bullion, equal to 176,672 oz. fine gold. The month shows a decrease of 11,100 oz., or 6.3% this year.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending Feb. 5 were as follows, in tons:

Granby, 11,280; Mother Lode, 3,643; Brooklyn, 1,888; Rawhide, 150; Emma, 180; Oro Denoro, 180; Senator, 120; Providence, 20; Skylark, 20; E. P. U., 20; Bay, 40. Total for week, 18,444; total for year, 73,285 tons, to date.

NOVA SCOTIA.

Active prospecting operations are being carried on in the iron region at Torbrook and Nietaux, N. S., by the Nova Scotia Steel & Coal Co. and the Londonderry Iron Co., both of which have obtained options covering considerable areas.

QUEBEC.

The Hill Crest Coal & Coke Co. has obtained a Dominion charter of incorporation, with $500,000 capital, and head office at Montreal. The incorporators are Rufus H. Pope, Compton, Que.; G. W. Fowler, M. P., Sussex, N. B.; R. A. Pringle, M. P.; M. P. Davis, Ottawa; Wm. Farewell, Sherbrooke, Que., and C. P. Hill, Frank, Alberta.

EUROPE.

FRANCE.

From official statistics it appears that the French railway systems in 1903 consumed 5,488,000 tons of coal, distributed as follows: Paris-Lyons Mediterranean, 1,384,000 tons; Northern, 1,032,000 tons; Orleans, 824,000 tons; Eastern, 773,000 tons; Western, 745,000 tons; Southern, 371,000 tons, and State, 242,000 tons. The Northern system naturally uses the coal from the fields in its territory, but the other lines are largely dependent upon foreign supplies, the State taking as much as 82 per cent. from foreign sources. Prices paid range from $4.29 on the State lines to $3.24 on the Northern Railway.

An extraordinary accident occurred recently at some large collieries near Ruabon, France. A surveying party was ascending the pit shaft when the descending cage, through the guides breaking or failing, crashed with terrific force against the other cage. Both became interlocked nearly 700 ft. from the surface. Great excitement prevailed, and two hours elapsed before both cages were released, five men being consequently suspended in mid-air meanwhile. During the stoppage the miners who were finishing work were brought to the surface by another shaft, but one imprisoned man was stated to have climbed the shaft to a place of safety at imminent risk to himself.

ROUMANIA.

Roumania's mineral oil exports in 1904 were: Crude, 25,675 tons; illuminating, 74,445 tons; lubricating, 6,668 tons; residuum, 13,575 tons; benzine, 39,131 tons; total, 159,524 tons.

RUSSIA.

Platinum production in Russia in 1904 was 395 poods (14,259.5 pounds), of which 95 per cent came from the Ural district.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½@.01¾
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10
Powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
ALCOHOL—Grain	gal.	2.38@2.40
Refined wood, 95@97%	"	.60@.65
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
ALUMINUM—Sulphate, com'l.	"	.75@1.25
AMMONIUM—		
Bromide	lb.	.20@.40
Carbonate lump	"	.07½
Powdered	"	.08½
Muriate grain	"	.05½@.05¾
Lump	"	.09½
ARSENIC—White	"	.03@.03½
Red	"	.06½@.06¾
ASPHALTUM—		
Barbadoes	lb.	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01½@.02
Chloride, com'l	100 lb.	1.25
Chem. pure cryst	lb.	.05
Nitrite, powdered	"	.05
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No. 1	sh. ton	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	18.75@20.50
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
BONE ASH	"	.02½@.02¾
BORAX	"	.07½@.07¾
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
CALCIUM—Acetate, gray	"	2.00
Acetate, brown	"	1.35
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Chloride, f.o.b. wks	"	9.00@10.00
CEMENT—		
Portland, Am., 400 lb	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb	"	.80
Slag cement	"	.75@1.25
CHLORINE—Liquid		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	9.00@19.50
Bricks, f.o.b. Pittsburg. M.	"	175.00
CLAY, CHINA—Am. com. ex-dock, N. Y.	lg. ton	7.75@8.00
Am. best ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best grade	"	16.75
COPPERAS—Bulk	100 lb.	.47½
In bbls	"	.52½
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11½@.11¾
FELDSPAR—Ground	sh. ton	9.75@10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
Am. pulverized	"	45.00
Best flake	"	150.00
Ceylon, common pulv.	lb.	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv.	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09½
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
" granular	"	.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton	6.50@7.00
Calcined	sh. ton	16.50@17.00
Bricks, best imp. f.o.b. N. Y.	M.	155.00
Bricks, domes, per qual., f. o.b. Pittsburg	"	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01¾
Sulphate	100 lbs.	.55@.95
MANGANESE—		
Crude powd.		
70@75% binoxide	lb.	.01½@.01¾
75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02½@.03¼
90@95% binoxide	"	.03¼@.05½
Ore	unit	.18 @.20
MARBLE—Flour	sh. ton	6.00@7.00
MICA—N. Y. gr'nd, coarse	sh. ton	33.00@38.00
Fine	lb.	.00½@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Litharge, Am. pow'd	"	.05½@.06
English glassmakers	"	.08½@.08¾
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01¾
Paris green, pure, bulk	"	.12
Red lead, American	lb.	.06½@.06¾
Foreign	"	.07@.08¼
Turpentine, spirits	gal.	.55
White lead, Am., dry	lb.	.05@.05½
American, in oil	"	.06@.06½
Foreign, in oil	"	.09@.09½
Zinc white Am. extra dry	"	.04½@.04¾
Foreign, red seal, dry	"	.06 @.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate cryst.	lb.	.08½
Powdered or gran	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08½@.08¾
Bromide	"	.15@.30
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08¾
Crystals	"	.08½@.08¾
Cyanide (98@99%)	"	.19@.20
Kainit	lg. ton	9.30
Manure salt 20%	100 lbs.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09¾
Prussiate, yellow	"	.13½@.13¾
Red	"	.34½@.35
Sulphate, 90%	100 lb.	2.11
96%	"	2.14
Sylvinit	unit	.41
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lb.	3.90@4.00
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, Crystals	oz.	.38½
SODIUM—		
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works.	"	3.50
Bichromate	lb.	.06½
Bromide	"	.17@.35
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 60@78%, f.o.b., works	"	1.75@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate com'l	"	.08½@.08¾
Hyposulphite, Am.	"	1.50@1.60
German	"	1.75@2.00
Phosphate	lb.	.02½@.02¾
Prussiate	"	.09½@.09¾
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
SULPHUR—Roll	100 lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y. Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	4.90
TIN—Crystals, bbl	lb.	.22
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½
Chloride granular	"	.04½@.04¾
Dust	"	.05@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate(Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

THE ENGINEERING AND MINING JOURNAL
MINING AND METALLURGY ESTABLISHED 1866

Western Coal Mining Conditions.

The Western bituminous coal mines have been fairly free from labor troubles during the current year. In fact, ever since the settlement, embodied in the Interstate agreement in April, 1904, there have been only occasional and sporadic disturbances, such as the short-lived strike of the hoisting engineers in Illinois, and the stubborn local strike at Ziegler, in the same State. The agreement of April last year was for a two-year term, so that the convention of the miners and operators at Indianapolis a short time ago was limited to routine business, and there were no troublesome questions to be settled. The existing contract is not satisfactory in all points, and there are several matters requiring adjustment, which will certainly come up at next year's convention. Chief among these is the run-of-mine clause, which applies to some of the Illinois districts only, and the differential between pick and machine mining. We have previously referred to the run-of-mine question, and to the universal complaint that the payment of wages on that basis leads to much more careless mining than where the screened-coal basis prevails. With regard to the differential, there is little doubt that it is too small, and that the tendency of the present rate is to discourage the introduction of machines. Back of everything is the question of unionizing the West Virginia mines, upon which a great deal depends.

While the management of the United Mine Workers has not been always wise, there is little question that, upon the whole, the Western coal business has derived certain advantages from the union. Matters have probably been better adjusted than they would have been without the existence of the union, and in Illinois, for instance, where operators as well as miners have an organization, instances are not lacking where the two associations have worked together to the advantage of both. In the case of the ill-advised strike of the hoisting engineers, for example, the United Mine Workers joined with the operators in securing the speedy resumption of work, and the settlement of the strike. As a general thing, the union in the West has respected its agreements, and has carried out its side of the general contract. The State of West Virginia, however, has never been unionized, and the work of the non-union miners in that State was one of the principal influences that finally broke the great strike of eight years ago, and helped to force the mine-workers to a settlement. All attempts to unionize the mines have been resisted by the West Virginia operators, and have been only feebly seconded by the miners themselves, who are apparently satisfied with the present conditions, though indeed a number of them know little about the union, and apparently care less.

Western bituminous coal mining at the present time is hardly in a satisfactory condition. It has been depressed by a number of causes, the leading one probably being overproduction. The output of coal in the West was stimulated by the anthracite strike of 1902, which deprived the western cities of their supply of hard coal, and led to unusual demands upon local supplies. This demand was kept up through the greater part of 1903 by the extraordinary activity in manufacturing everywhere, and the consequent large demand for steam coal, which more than made up for the abundant anthracite supplies. When trade began to grow slack towards the end of 1903, coal mining continued on a large scale, the result being an overstocking of all the markets, and a pressure to sell coal, which necessarily brought about such low prices as to be unprofitable to the operators. Thus, cases were not lacking in which slack was sold as low as 30c. or 35c. per ton at certain mines; a rate clearly disastrous to the operators. Many mines must have showed a very poor balance sheet at the close of 1904. The improvement in business, which came with the current year, has bettered conditions somewhat; nevertheless, there is still a surplus which serves to depress the markets. Other conditions have been unfavorable. Thus, the lake coal trade to the Northwest was disarranged by the delay in opening navigation last spring, and was not as brisk as had been expected, though its volume was nearly up to that of the preceding year. The river coal mines in the Pittsburg district were seriously affected by the long drought, and the difficulties of navigating the Ohio. An almost unprecedented period—nearly six months—passed without a coal-boat rise at Pittsburg, and a good share of the trade which has always belonged there was taken by competing mines on the Kanawha, in Kentucky, and even in Alabama, considerable shipments of coal from Walker county in that State having been sent down the Mississippi to New Orleans.

West Virginia has for years been a disturbing element among the western coal producers. The production of the State has been rapidly increasing, and the comparative cheapness with which the coal is mined in thick seams, with lower rates of wages and with the company-store system in full blast, enables the operators there to compete with local coals all over the West. It may be added that they are favored also by the high quality of most of their coal. In Chicago, and other large cities, West Virginia coal commands a better price than almost any other grade, with the exception, perhaps, of the Hocking Valley, and of some of the coals from western Pennsylvania. The competition has been especially felt in the Illinois districts, and in the block-coal region of Indiana. The great strike of 1897 gave the West Virginia operators an opportunity to introduce their coal into western markets, which they were not slow to take. Their advantages just mentioned, and also the quality of their coal, have enabled them to keep the market which they then secured, and upon which they are constantly increasing their hold. The competition is, of course, a fair one, into which they have a perfect right to enter, and it is entirely natural that they should seek to make the best of their opportunities.

Whether matters can be improved is uncertain. No large scheme for curtailment of production seems to be feasible, and as long as a surplus continues to be mined, there will always be a certain quantity which must be marketed at unprofitable prices, if at all. All these questions will have to come up when the Interstate agreement expires next spring. There is little prospect of unionizing the West Virginia mines, and it remains to be seen whether the United Mine Workers will consent to an agreement which will put Indiana and Illinois in better condition to meet competition.

Melting Points.

A. L. Day and E. T. Allen have recently prepared, in the laboratory of the United States Geological Survey, apparatus for generating, regulating and measuring temperatures up to 1600° C., which, according to *Electrochemical Industry* (December, 1904, II, xii, p. 500), has proved easy of manipulation and very exact. It is in effect a reproduction of the Reichsanstalt temperature scale, the temperatures being measured with thermoelements exclusively. The scale is established from the melting points of four metals, viz., cadmium, zinc, silver and copper. The melting points of those metals, as determined at Washington and Berlin, are as follows:

Metal.	Washington.	Berlin.
Cadmium	321.7°C.	321.7°C.
Zinc	420.0	419.0
Silver	962.2	961.5
Copper in air	1065.3	1064.9
Copper in reducing atmosphere	1083.6	1084.1

These melting points are, therefore, well established for pyrometrical calibrations.

In the manufacture of arc-light carbons, various devices are used to lengthen the arc, and also to tone its color; thus calcium and magnesium fluorides give a long yellow-red arc which is clear and stable. The yellow flame is most serviceable in illumination. The effect is due to volatilization of the associated salt, which is mixed with the powdered carbon before pressing. Fluorides confer great volatility.

Hydraulic Mining in Humboldt County, California.

We are indebted to Mr. H. De C. Richards, manager of the Orleans Bar Gold Mining Company, for a number of excellent views, three of which we reproduce, and for the following notes:

RIFFLES AT ORLEANS BAR.

Orleans is in the northern end of Humboldt county, and on the north bank of the Klamath river, 50 miles from the coast. Freight is packed over a 78-mile trail at a cost of 3c. per lb. The company owns a comfortable village on the river, and among the hills an area of 1,420 acres of patented land.

Water is brought from the mountains through a 14-mile stretch of flumes and ditches, traversing throughout its length a district of extreme ruggedness. Its upper end is fed by a tunnel 520 ft. long through a ridge of porphyry. Two sawmills, abundantly supplied from the forests of Oregon pine, fir and oak, provide the necessary lumber.

FERRY ON THE KLAMATH

The gravel bank, about 100 ft. high, is attacked with a 7-in. giant working under a head of 225 ft. The débris is carried away in two sluices cut into bed rock, one of which emerges from the face of a precipice with a clear fall of 109 ft. Just above this point, life-saving devices span the current to lessen the risk of working along the sluice. This precaution has already justified itself upon one occasion. One of the views reproduced shows a part of this sluice, cut through the rock.

A transit survey of the bank is made after each clean-up, on the first of the month. The average cost of washing per cu. yd., including improvements, all expenses and taxes, was 2.483c. during the year 1903-04 and shows a reduction of about 0.5c. from previous years. The area washed during that year was 6.92 acres, with an average flow of 226 miners' inches, of 1.5 cu. ft. per min. The discharge from the ends of the sluices flows over the steel-shod riffles shown in the picture. Blanket-tables (not shown) are placed below the riffles.

SLUICE CUT THROUGH SOLID ROCK.

In approaching Orleans from the south, the Klamath river has to be ferried. An Indian, Red Neck, is the owner and operator of this enterprise. He also owns a small placer, with water rights up in the hills, and divides his energies between working this property and gambling, making a living between them. The party in the second picture are representatives of the Selby Smelting & Lead Company, who were visiting Orleans.

The Limestones of Southwestern Pennsylvania.

'Bulletin 249' of the United States Geological Survey, by Frederick G. Clapp, summarizes the economic value of the limestone beds in the southwest corner of Pennsylvania. These are of Carboniferous age and contain high proportions of impurities, rendering them unfit for building stone, but many of them yield lime of good quality, great quantities of which are used locally for fertilizer. They are largely quarried for railroad ballast and for furnace flux. A few beds have afforded rock suitable for natural cement, but only one—the Vanport—is of sufficient purity to be used in portland cement. It is so used by only one plant, at Wampum, although its wide extent and its numerous exposures make it available for more extensive utilization.

Magnesium-Amalgam.

Magnesium powder will amalgamate with mercury at ordinary temperatures. Amalgamation starts slowly but evolves heat, which causes the combination to become more rapid. In some cases, however, extraneous heat is necessary to start the process. Amalgams containing 5 to 10% magnesium can be thus prepared. The amalgam with 10% Mg is thickly fluid when warm, setting to a hard, crystalline mass when cold.

Ore Treatment at Laurium, Greece.

By Henry F. Collins.

Near the port of Ergasteria, there are two large companies engaged in smelting the output of the ancient mines of Laurium. The French company alone carries on mining operations in a large way. The Greek company for years past has treated accumulations of slag left by the ancients, together with heaps of slime-residue from their handwashing, and the waste found both inside and outside the mines, mostly in the Souréza district; and if this company had devoted as much capital and technical skill to the work of exploration upon its large concessions as the French company has done in its own sphere, it is probable that important new orebodies would have been laid open.

The slag, slime, etc. have the following composition:

	Lead %	Silver oz.
Slag	8 to 13	11 to 17
Slime	7 to 10	40 to 50
Wasteheaps and fillings underground	3 to 8	20 to 40

The best of the old slag and slime, however, has been already treated; and what is left of the former is mostly under the waters of the bay, from which it is dredged. The waste and filling left behind in ancient mine workings, which now average only 3 to 4% lead, are concentrated in a dressing plant (the largest in Europe), which has a capacity of over 1,000 tons per day. The concentrate is smelted and the tailing accumulates; the slime is efficiently settled in a series of tanks, from which it is dug out for smelting, the clear effluent water from the last tank of the series being pumped back and used as dressing water.

The slime and fine ore are bricked in a simple manner. Heaps are first built up in layers in any convenient proportions, namely, slime, concentrate, poor flue-dust, and rich screening of fine ore. The heaps are oblong in form, about 4 ft. high, and contain 60 tons. They are well watered by means of a hose, and are then cut down and their contents wheeled to an ordinary wet-clay continuous brick machine; where a little more water is added, the mixture issuing from the pipes or nozzles in the form of two long streams of oblong section with rounded corners, about 4 in. high by 6 in. wide. A laborer cuts these with a spade as they issue upon a belt, and relays of boys carry off the bricks (which weigh about 22 lb. each) to a drying ground. So argillaceous is the material that, after two days in ordinary dry weather, the rough bricks thus made, without any pressure and without adding any lime, can be handled and stacked under cover for use. Ordinarily from 250 to 500 tons are made per day, but a stock has to be acumulated in the summer months and carried over to the winter, when work is often stopped by cold and wet weather.

Smelting is performed in round Castilian furnaces with four water-tuyeres. The height of charge-column is about 9 ft.; a charge composed of slag, a little coarse ore, and briquettes, together with some iron ore and limestone flux, is fused with about 15% coke, using a fan blast at a pressure of 10 in. water, and yielding about 9% work-lead which carries 50 to 70% silver per ton. The slag is fairly free from lead and silver, it contains about 25% SiO_2, 35% FeO and MnO, 17% CaO, 8% Zn, and 12% Al_2O_3. In spite of long flues, the loss by volatilization is enormous. Owing to the falling off in the grade of material now available, and to the increased difficulty in getting it, the Greek company's operations are not now nearly so profitable as they were some years ago, neither are they carried out on so large a scale, the output of argentiferous lead showing a steady decrease.

The tonnage of various classes of ore, produced by the mines belonging to the French company of Laurium, has been already referred to. For most of the following details of ore-treatment, and for permission to publish them, I am indebted to Messrs. P. Albrand, director-general, and L. Guillaume, chief engineer.

The calamine has to be calcined before shipment, in order to save freight; it is screened at the mine, to half-inch. The coarse ore is calcined in a small egg-shaped kiln, the inside dimensions of which are about 13 ft. 6 in. high, 9 ft. wide at the middle, and 7 ft. 6 in. wide at top. The fuel is coal of poor quality, the consumption of which is only 4 to 5% of the weight of ore, the total cost of calcination being very low.

The fine calamine is calcined in superposed double-hearth reverberatories, each hearth being 16 ft. long by 7 ft. wide. Each furnace calcines 6 tons per day, a charge of 1.5 tons weight being withdrawn every 6 hours. The coal consumption is about 20 per cent of the weight of ore calcined.

The manganiferous, spathic-iron ore, like the calamine, is screened, and the oversize is calcined in large circular grateless kilns supported upon short cast-iron columns, the inside dimensions of which are 30 ft. high, 13 ft. 6 in. wide at bottom, and 11 ft. 6 in. wide at top.

The fine manganiferous spathic ore was formerly regarded as a waste product for which there was no market. Recently an ingenious system of 'blowing up,' by an air-blast on perforated grates in small revolving kilns, has been devised by the engineers of the French company; this method—utilizing the fact that the heat given off by the oxidation of the manganese is greater than that required for the expulsion of the carbonic acid and water present—is carried out with only a small consumption of fuel, enough to start the reaction. The heat evolved by the reaction is so great as to cause incipient fusion of the silicates present, and therefore the product takes the form of a porous clinker, admirably adapted for smelting.

The mixed sulphide ores are crushed and concentrated in a jig-and-table plant of ordinary type having a capacity of 200 tons per 24 hours. The plant is composed of two units throughout; owing to the fineness of the intermixture of sulphides, the all-through size adopted is 3 mm., and the trommel-series comprises five sizes, ranging by differences of 0.5 mm. down to 1 mm., followed by hydraulic sizers. The jigs are a double row of eight, all four compartments with divided shafts, the last two compartments having a quicker stroke than the first two. The jigs turn out two products, a lead concentrate with 60% Pb and about 6% Zn, and a zinc middling with 28 to 30% Zn and 12 to 14% Fe, which is allowed to accumulate for five or six days and then re-cleaned by running through separately, the ore-feed being stopped for the purpose. The tailing is delivered into tanks outside the building and shoveled into railway trucks, the overflow water going to big settling ponds, from which it is pumped back to the mill. The overflow from the hydraulic separators is settled in large spitzkasten, the discharge from which, until recently, was treated only upon five Linkerbach tables. The tailing from these will be treated in future upon tables; the Wilfley, Krupp and Ferraris types are now being tested in competition upon identical material; while for the still finer slime, which at present is settled in large ponds and smelted *en masse* after briquetting, a revolving table of Cornish type is to be tried.

The mixed lead concentrate, from jigs and buddles, averages about 50% lead and 20 oz. silver. The re-cleaned zinc middling is being accumulated for future treatment by magnetic separation, which has given good results experimentally.

The lead concentrate is roasted in long hand reverberatories 39 ft. long by 12 ft. wide. Each furnace roasts from 6 to 7 tons. per day, being worked in four charges of about 1,500 kg. each, one of which is dropped every six hours. The sulphur content is reduced from about 24%, to 6 or 7%, and the fuel consumption, with poor coal, is about 18 to 20 per cent.

Smelting is done in a nest of 12 circular masonry blast-furnaces provided with water-tuyeres. Most of these are of the old Spanish type, with only four tuyeres, and measuring inside only 55 in. diam., with a charge column 9 ft. high. The more modern furnace has eight tuyeres, and is 5 ft. diam., with a charge column of about 14 ft.; this has naturally a much greater capacity with a smaller volatilization loss.

The smelting charge is made up entirely without barren fluxes, the various classes of ore from the different mines uniting to make a perfect smelting mixture. Each charge consists of 6 cwt.

coarse ore and 6 cwt. of briquettes, made in the way already described, roasted lead concentrate, and flue-dust; it is smelted with a consumption of 15% of poor coke. Blast is supplied at an average pressure of 10 in. water, or say 7 oz., by means of three large fans about 5 ft. diam., driven at a speed of 800 revolutions by two Crossley gas engines, the gas being generated from lignite by means of a Fichet-Heurtey plant. The lignite is obtained from the island of Euboea; it yields 45% volatile matter (including 7% combined water), 12% ash, and 43% coke; one metric ton of it gives 5,000 French calories as against 8,000 for the imported coal. The slag obtained is fairly free from lead. The average composition is SiO_2, 25%, FeO and MnO, 35%, CaO 17%, Zn 8%, Al_2O_3, 12%, with lead under 0.75% by dry assay, and silver barely 0.2 oz. per ton. The matte averages 2% of the charge, and is all returned; it contains about 1% Pb, 6% Zn, 1 to 2% Cu, and 10 oz. silver. A good deal of speiss is also made, but as it only contains 1% Pb and 3 oz. Ag per ton, it is not worth retreatment. The bullion is tapped once; in quantity it amounts to about 7.5% of the charge, and it contains about 0.5% Cu and 0.3% As, besides smaller amounts of antimony and bismuth, and from 0.18 to 0.2% silver, equal to 57 to 64 oz. per long ton.

Analyses of some of the principal furnace products are given in the appended table:

ANALYSES OF FURNACE PRODUCTS.

	Slag.	Matte	Speiss.	Work-lead.	Flue-dust.
SiO_2	25.00	0.80	0.80	98.50	0.16
Fe	23.68	50.83	63.80		
Mn	3.09	1.66			tr
Al_2O_3	12.00	3.83	4.96		
CaO	16.83				
As		0.40	20.75	0.30	31.72[1]
Cu		1.85	0.63	0.50	
Zn	8.00	7.57	1.75		3.70
Bi				0.05	
Sb				0.12	
S	2.52	21.81	4.61		6.43
Pb	0.56	7.75	0.50		39.45
Ag	0.0006	0.025	0.0109	0.190	0.03

[1] As_2O_3.

The loss by volatilization in these low furnaces is, of course, enormous. Long flues are provided, extending to a total length of 3 km. They are built simply of masonry with an arched brick lining, and measure 3.5 m. high by 3 m. wide; they stand well without any binding. The average of the flue-dust collected is about 40% Pb, with from 15 to 25% As. A considerable quantity of the 'rich' flue-dust, containing as much as 25% As, is shipped to works at Antwerp for refining.

Owing chiefly to the loss of lead by volatilization, it is proposed to replace the present old-fashioned furnaces by a couple of modern water-jacket furnaces of American type, which would easily handle the tonnage at present put through 12 furnaces. Besides the additional saving of lead, a slight saving in labor cost and in fuel consumption is anticipated.

The Chicago drainage tunnel is to develop, at one point, 27,000 horsepower.

Adsorption in Ore Deposition.

By Walter Harvey Weed.

An important discovery in the physico-chemistry of ore deposition has been made by E. Kohler, who finds that clays, colloid substances, etc., possess the power of extracting metals from very dilute solutions.[1]

Adsorption is the term used to designate the property possessed by certain clays, porous, carbonaceous and colloidal substances, such as gelatinous silica, of taking out a part of the material held by quite dilute solutions passed through them. Thus, if a 1% aqueous solution of copper-ammonium sulphate be passed through a filter coated with kaolin, all the copper is taken out and remains as copper oxide in the kaolin, the filtrate consisting of ammonium sulphate. This property of absorption is supposed by Kohler to exist in the clays of many epigenetic deposits, for example, that of the galena-bearing limestone of Commern, Germany; the lead-bearing sandstone of Freihung, etc., and to account for the deposition of ore in such clayey orebodies as a result of metalliferous solutions seeping in from fissures. The idea is worthy of careful consideration, because many veins contain masses of clay and koalin which carry high values in gold and silver. The kaolins of the Broken Hill silver mine, which are so rich in horn-silver, may be similarly active, as advanced years ago by the Australian geologists, who compared the action of the kaolins to that of a filter.

The writer has long been impressed by the association of particularly rich copper ores and clays in many copper mines, and particularly the constant association of the crystalline ore minerals and kaolin in vugs in the veins of the Butte district in Montana. This led to the initiation of experiments in the Survey laboratory, which at first proved non-conclusive, using fullers earth, but in experiments with crushed clay from Morenci, made for Mr. Lindgren, remarkable results were obtained, 90% of the copper being extracted.

In further experiments made by Dr. Sullivan, in the laboratory of the Geological Survey, an attempt was made to use the natural mine waters from Butte, Montana, filtered through the clayey material from the mines, but the tenacious blue clay of these workings contained so much pulverized pyrite and ore, the clay being a friction product formed by faulting, that the result was unsatisfactory.

This process changes, to some extent, our idea of the function of clay walls along veins and the theories based thereon, and gives a good reason for the search of miners for a selvage.

The importance of this process appears to be very great. It not only explains the close association of copper ores and shales, but it promises to be a positive aid in prospecting and mine development. It throws considerable light on the formation of ore-shoots of rich copper in many mines, where, as at Butte, Mont., in Arizona, and in Mexico, they occur associated with clays. Moreover, it explains the frequent association of nodular and disseminated copper ores in clays as a secondary product.

[1] E. Kohler. 'Absorptionsprocesse als Faktoren der Lagerstättenbildung und Lithogenesis.' Zeitschrift für Praktische Geologie, 1903, pp. 49-59.

Quicksilver in Algeria.

The first quicksilver mine in Algeria commenced production in 1903. It is at Taghit, and the deposits are reported to be quite extensive. The works, which were built in 1903, are equipped with two furnaces, one being a Spirek shaft furnace, with a capacity for treating 6 tons of ore daily, and the other a Cermak-Spirek roasting and calcining furnace, also of 6 tons capacity. The first year 20 metric tons of quicksilver were produced and exported. The figures for 1904 are not yet attainable, but it is understood that there was considerable increase.

The ore carries zinc, which is also recovered after driving off the quicksilver.

Volunteer Medical Corps at Coal Mines.

The Philadelphia & Reading Coal & Iron Company is organizing a volunteer medical and surgical corps at each of its forty-four collieries in the anthracite region, and these corps will, it is expected, save many lives. Many accidents have been followed by fatal results owing to the lack of the prompt medical attendance which it is the design of this company to provide.

Under a recent law, all the mines have been fitted with hospitals, supplied with all the first aid appliances that are needed for treating any kind of accident sustained in the mine. These hospitals are usually cut out of the solid rock or coal, and are at one side of a main gangway.

The Philadelphia & Reading Company, in training an efficient corps in medical and surgical work at each mine, selects men from among the most intelligent workers. The work is in charge of Dr. G. H. Halberstadt, surgeon major.

The absorbent power of charcoal has long been known, but Sir James Dewar has recently shown that its efficiency is enormously increased by strong refrigeration, as by liquid air. Charcoal so cooled absorbs both oxygen and nitrogen, but does not absorb helium. One remarkable feature is that charcoal can even condense hydrogen at its own boiling point (25° absolute, or —248° C.), though charcoal cannot so absorb hydrogen at the temperature of liquid air, or —185° C. Evidently there is much to be learned regarding the surface-tension of porous carbon.

The Mesabi Iron-Ore Range.—VI.

By Dwight E. Woodbridge.

"They's no f-f-foot nor 'angin', no rock for to s-s-sink they shaft; I dunnaugh wa-at the b-bl-bloody 'ell I'll do for 'e." And this fervent appeal from Cap'n Jim for light on a bad situation has met with a response in the mind of many an old range superintendent who has come up against the proposition of opening a Mesabi underground mine.

If used often to be something like this: The mining captain and a foreman would get out in the morning among the timber on the location and the captain would open the ball by saying: "H-ole, there's a man hup from Cleveland by the day, an' 'e say they's to mine oore 'ere; w'ere does thee say we'll sink?" "Wall, Ay. tank," answers Ole, "rit yoinin' de aige of dose timber bane gude plac. Ay tank it bane handy for tracks from de Dulut road oop, and ve'll sink timber shaft in de sidehill by yunction. Oonderground Ay tank ve hit oore har, vell as any oder plac." "They'll be oore comin' out o' 'ere by the spring, they say, so 'e'd better be doin' work now, H-ole."

Many a big mine has been opened on no more preliminary plan than this. The splendid work of skilled practical mining captains all through the Lake Superior, and everywhere ore is mined, has been more of an intuitive knowledge, almost a congenital instinct, brought down through long generations of successful miners, than of scientific and accurate information on the problem immediately at hand. Wonderful stories are current through the Lake region of the unerring instinct of old mining men, who could put their hand on a face of barren and apparently unpromising rock, and say, "We'll drift here so many feet and we shall get ore." There have been records of production and cost to which every man concerned can point with pride, of steady advance in accuracy, skill and results, and no one can say too much for what he has accomplished. Methods, machinery, systems of operation, all bear the sturdy and substantial impress of the early day miner, whose place in the front rank of Lake Superior operations is manifest and admitted.

But it has been recognized, as drill operations at Mesabi range mines were shown to be such as would easily disclose the extent, character and depth of orebodies, that the most definite preliminary layout possible might be utilized to give a system of opening mines more scientific and more in line with advanced practice in other operations than the rule of thumb. This new system was based on a careful interpretation of records of underground exploration by the drill, and on a knowledge of structure of typical orebodies, as they existed on the Mesabi range. It is the recognition of the fact that orebodies have a definite and determinable structure, and that this structure should have its bearing on mine development and operation. By it the laying out of a mine is a matter of civil engineering, and is carried on in the offices of the company, after thorough and complete drillings of the entire orebody. The placing of shafts and main drifts, the manner of drawing ore to shaft pockets and the drainage of the orebody, are all understood before the first pick is inserted in the ground. The natural consequence is, that precision marks every step in the operation of opening and maintaining the mine, the number of unforeseen accidents is reduced to a minimum, the unnecessary driving of drifts and levels through barren ground is eliminated, methods of winning ore and tramming it to the shaft are simplified, the amount of ore impossible to reach is very little, and the most exact information is at all times immediately attainable, while those connected with the management can have in mind a picture of the exact size, shape, grade and condition of the orebody as a whole.

In order to carry out the system of operation it is necessary that exploration of the orebody and its structure be very full, more so than is usual, and holes are put down at intervals of not more than 200 ft., while it frequently occurs that when these holes are plotted out on paper it is found that, to check up the contours in the surrounding rocks or of the interior structure, additional holes are required. These are sometimes not more than 100 ft. apart. The holes, correlated from a uniform bench mark, form a series of levels of the orebody. These levels, plotted to two bases, of which one is the surface of the underlying ferruginous chert, the other the surface of the ground, give information from which the foot and hanging, or the lower and upper levels of the orebodies, are respectively worked out on paper. By a series of rectangular intersecting cross-sections the outlines of the entire orebody are accurately determined. These worked out, it becomes necessary to plot the intermediate structure. As has been said in this series, typical Mesabi orebodies are laid down in channels, and rest usually with two lenses of higher-grade ore, separated by poorer grades, working gradually from one to the other, and to highest and lowest values. With the vertical information furnished by drill-hole records, it is a simple matter to plot the whole orebody and its chemical and physical structure. Horizontal sections, on which are plotted the contours of the basin inclosing ore, are also made. These include, of course, that part of the basin containing the upper and lower bodies of better ore, each part of the basin being plotted separately. It frequently happens that the two orebodies in a single basin overlap; the lower portion may run out beyond the limit of the upper, and *vice versa*.

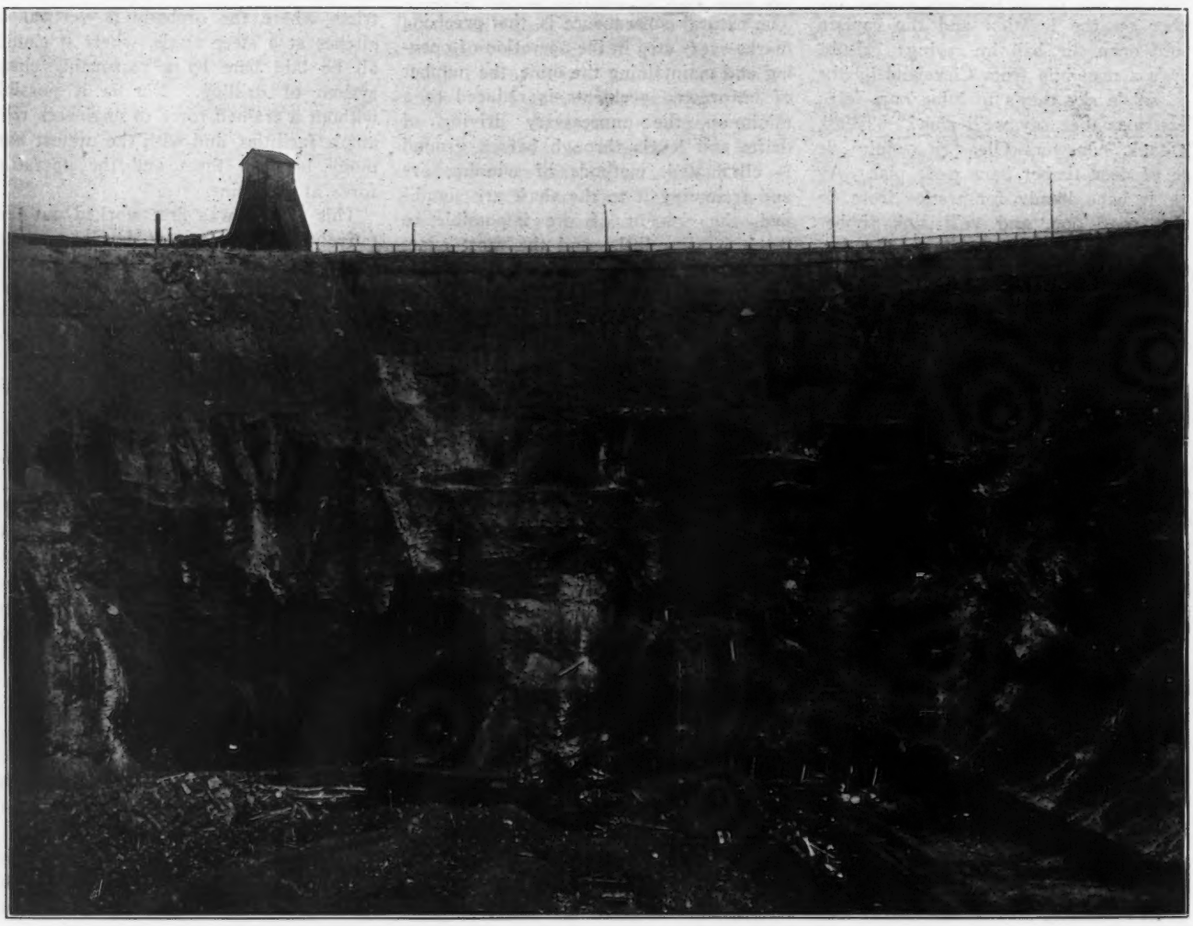
All this information at hand and graphically presented, the question of how the mine shall be opened; if underground, where its shafts shall be sunk, where its main drifts shall run, how it shall be pumped, and every other question, is plain. If open pit, there is no difficulty in locating approaches and main tracks, or in placing drifts for drainage. Of course, no such method will be possible in districts where the orebody is vertical or pitches at a steep angle, where it cannot all be laid bare by a reasonably cheap system of drilling. Nor is it possible without a trained force of engineers, with ample facilities, and with the utmost harmony between them and the operating force at the mine.

This system was first worked out tentatively for certain new developments at the Adams mine, then belonging to the Lake Superior Consolidated Iron Mines, or the Rockefeller syndicate, under the supervision of Mr. W. J. Olcott, general manager. It was suggested by Mr. J. Uno Sebenius and worked out by the aid of Mr. C. S. Simpson, now superintendent for the Hibbing district. As it was extended and tried at the mines of Eveleth, Hibbing and elsewhere, it received the hearty co-operation of Messrs. J. H. Hearding, of the Adams-Spruce; P. Mitchell, general superintendent at Hibbing; R. R. Trezona, of the Fayal, and others. When Mr. T. F. Cole, as operating head of the Oliver Iron Mining Company, was brought into close touch with Mesabi developments, he immediately grasped the significance of the method and gave full opportunity for working it out on a large scale. It is now applied to all the important Mesabi mines of the Oliver Company, and is being extended to some other large properties.

Ore is won underground in this district by the slicing-and-caving system and by square-set work. Slicing is now taking the place of other methods. Not long ago the use of saddle-back stulls was looked upon as a coming system, but it has been abandoned for various reasons, notwithstanding its saving of timber and large product per man. In slicing, the main levels are about 65 ft. apart, and sub-levels are planned to be driven about every 20 to 25 ft. Usually all sub-levels are worked back from the breasts simultaneously, though the upper is worked ahead of those beneath it. This upper sub-level is next beneath the roof, and the ore is taken out in slices wide enough to hold the overburden, wider or narrower according to the character of the roof. When the top sub-level is worked out it is planked, to keep out dirt, and caved, and the lower ones follow it back

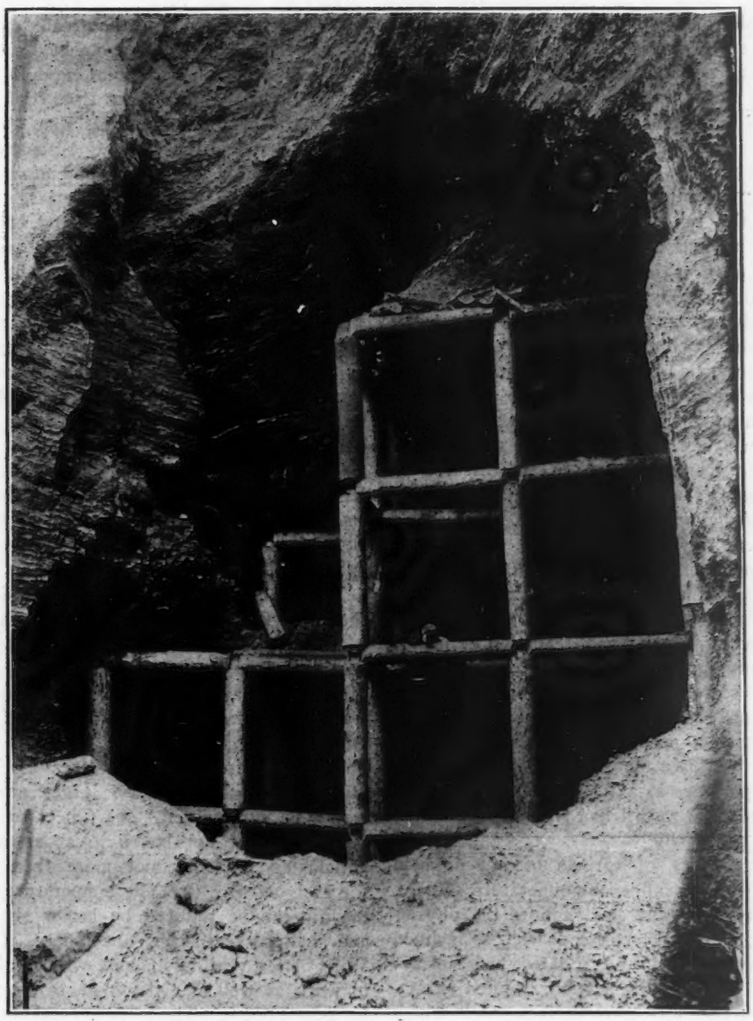
one after the other, each caved in the same way. All ore is drifted out, shoveled and dumped into chutes leading down to the main level, where it is drawn into cars and trammed to the shaft. Usually the roof follows down easily, being drift and loose boulders; where there is a coating of hardpan or clay, it is more difficult, and blasting has to be resorted to. In the square-set method, not far from half the ore in a room can be taken out by milling into cars, and the product per man is very large, as overhand stoping brings it down easily and quickly. Though Mesabi ores are loose and soft, they are coherent enough to stand well under some pressure, and pillars for square-set mining are quite thin. Indeed, there are no pillars as generally regarded; one or two sets wide are left, and when the room is brought back these are scrammed out. Of course, there is some loss of ore, and the cost of taking it is greater than in other ways; that is one reason why the system is losing its hold. After mining out a room, it is filled by drawing down the overburden from a raise put through to surface for the purpose, or by breaking in roof and timbers by blasting. A room is usually three to five sets wide at first, sets having 7.5 ft. width between centers, and it is ordinarily three or four sets high, though in extreme cases rooms have been run up to 80 ft. Now they vary up to an extreme height of about 65 ft. Some rooms run to 300 ft. or more in length. At Fayal, Superintendent G. W. Wallace introduced a system of winning ore by saddle-back stulls, with a combination of milling that worked out the bulk of the ore in rooms at a low cost; but it was expensive and wasteful when it came to wind up the level, on account of the nature of Mesabi ores. It might be successful elsewhere, however. The top of the room was first cut out by driving a wide drift just in the top of the ore and supporting it with stull timbers arranged in saddle-backs as wide as the room, which timber became its roof. Ore was then milled through raises, down which it dropped to pockets above a main drift in the bottom of the room, and from these pockets was drawn into cars. With the 60-ft. high sides of this room left unsupported, it required a pretty coherent ore to stand up, and this system is not possible at many mines. With ore traversed by occasional steep and thin fissures, or seams, filled with crushed quartz or similar material, as is frequent on the Mesabi, such a method would not do. Where possible, it would save timbering, and ore is as easily broken as in surface milling mines.

Shafts have usually been sunk in ore, and the amount of ore tied up in a 40-ft. shaft pillar is of little moment in mines that cover 40 acres or more. Where the deposits are small, or of especially desirable ore, shafts are sometimes sunk in rock; usually now the Oliver Company sinks its shafts in the deeper ore-channels where exploration shows the proper place. Most shafts are at an angle of 65° to 70° with the horizontal, for ease in loading skips at shaft pockets and dumping at surface without spilling ore. Most shafts are three compartment, with two balanced skips of from three to five tons capacity, and a shaft of this size will readily hoist 50,000 tons a month. Timber-ways are entirely separate. Underground main-level pockets are large enough to hold the ore trammed for some little time, and are thus a balance-wheel between mining and hoisting, making either independent of the other for a while. Hoisting drums are quite frequently 6 ft. diam., and with a face depending on the depths of shafts. Very few shafts are more than 200 ft. deep. Hoisting engines form a problem varying



MILLED PIT AT FAYAL MINE, MESABI RANGE.

with individual conditions and tastes, but are usually simple in type and rarely compounded. There is no serious ventilation problem at Mesabi range mines, and a few doors are all that is necessary to maintain good draft. Shaft-houses have usually been of wood, but steel was introduced five or six years ago at the Adams,



CAVE AT FAYAL MINE, EXPOSING TIMBERING.

and its use is extending. It is odd that, in a region whose great crop is timber, it should have been found more advantageous to build of steel. The steel shaft-house was first introduced in the whole Lake Superior region, iron or copper, at Aurora mine, on the Gogebic range, and next at the Adams. Timber shaft-houses usually have main timbers 12 ft. by 12 ft., and are high enough to bring the tram tracks to stockpiles about 40 ft. above ground. Ore is stocked in long and narrow piles, in order that the pile may increase fast enough to prevent its freezing too solidly. A frozen stockpile thaws out very slowly, and with a winter temperature running down to 40° and 45° below zero, it becomes a mass that is still solid into late summer.

More than 95% of all the ore mined on Lake Superior is denominated soft ore, soft hematites and limonitic ores; about 10% is classed as magnetites. It is not easy to give a definition of soft ores in contradistinction from hard. In the early days of Lake mining on the Marquette range the production was confined to hard specular or slate ores, such as Jackson, Cleveland and New York and the Champion magnetic ore. When Negaunee was first opened the ores received the name "soft," which was in the nature of an intended stigma, and properly belonged to an inferior ore. When, in 1876, 1877 and 1878, Nelson P. Hulst opened the early Menominee range mines at Waucedah, Vulcan, Norway and Quinnesec, the mine-owners and operators from the Marquette country who inspected the new and promising district did not attach much value to it, saying: "You must have hard ores to help the sale of your soft, for the only way we can dispose of our Ishpeming and Negaunee soft ores is by compelling purchasers of our hard ores to take a certain percentage of soft with what they buy of us. Yours, being all soft, cannot be sold."

In this, as in many other things, including the Mesabi range itself, the exigencies of the times have made valuable what was frowned upon, and have wiped out differentials that seemed insurmountable. In reality, a 'hard ore' means an ore slaty or specular in texture, such as Cleveland, or Lake Superior mine, or the ores of Soudan; yet in nearly all old range soft ore mines there is found a certain tonnage of hard and sometimes slaty ore. Old range soft ores are more open-grained and porous, more friable and easily smelted than the denser hard ores of the so-called Marquette district; but Mesabi ores are often so fine as to lose the other advantages now recognized as inherent to their texture.

We regret that, owing to a delay in transmission, the maps illustrating the system adopted for plotting the bore-holes on the Mesabi were not received in time for reproduction and publication with the present article. We hope to give them, however, in our next issue.—EDITOR.

Aluminum foil is used largely as a substitute for tin foil. One kilogram (2.2046 lb.) of the metal is spun into 32 sq. m. of thin sheet. Some of these sheets adhere together, and this is worked into powder.

A valuable refractory lining is said to be made by mixing basic substances, as magnesite ($MgCO_3$), chromite ($Fe[CrO_2]_2$), chromic oxide (Cr_2O_3), or the like, with water-glass (sodium silicate) and calcium chloride. There is a reaction between the two latter substances, giving sodium chloride and calcium silicate. After putting in place and drying, it is again moistened with calcium chloride. After a second drying, a hard, permanent lining results, which is said to suffer no further change. The patent is held by Westinghouse.

There are in nature one common hydrated form of silica and three anhydrous forms. The former is opal, which includes a vast group of more or less dehydrated silicic acids; this is amorphous and does not polarize light. The anhydrous forms include: (a) Common quartz, which is in the rhombohedral-trapezohedral subgroup of the hexagonal system, and is optically positive; (b) tridymite, which occurs in tabular plates in certain eruptive rocks, is pseudo-hexagonal, and optically positive; but, unlike quartz, is soluble in boiling sodium-carbonate; (c) cryptocrystalline agate, onyx, flint, etc., included under the general group chalcedony, which is made up of microscopic radiating fibers.

Underground Temperatures.*

By F. G. Meachem.

The influence of season upon temperature extends downward to a limited extent; in tropical countries, such as Java, not more than a few feet; while in Germany, surface beds at a depth of 82 ft. have an average temperature of 48.20° F. In Siberia, frozen soil is met with at a depth of 260 feet, there being but little variation in the annual temperature.

It is generally considered that, at a depth of about 65 ft., temperature increases at the rate of 1° F. for every 60 ft. of further descent. It is interesting to note the variations shown in the British Association's reports. All observations were made with instruments having maximum and minimum indexes. Each thermometer was placed in a bore-hole driven for 10 ft., plugged with wood and clay, and left from one to three months. The mean increase is 1° in 64 feet.

The writer made various temperature tests at Hamstead Colliery, near Birmingham, England, extending over a number of years. Taking first a series of surface tests, it was found that the mean annual temperature was about 49° F. During the long frost of January and February, 1895, the average temperature at the pit bottom was 50° F., while on the surface it was 25½°. On Feb. 8, 1895, with a surface temperature of 4° we noted a temperature of 43° at the pit bottom.

In hot weather the pit bottom is cooler than the surface. The average temperature was about 60°, or 11° higher than the surface in ordinary weather. It was estimated that, at common ventilation rates, 3½ min. were required for the passage of air down the shaft; and in this time the air approximately reaches the temperature of the shaft walls. Being also compressed, as it descends the shaft (the heating effect due to this is estimated to be at the rate of 5½° per 1,000 ft. of descent), the air of the shaft would be 10° higher in temperature at the bottom than at the surface. This would seem to show that the increase of temperature at pit bottom is mainly explained without assuming any heat extracted from the strata in the shaft; but, considering that moisture is absorbed in the shaft, which would cool the air somewhat, heat must certainly be taken up from the strata, or the air would be cooler than it is. The temperature of undisturbed strata at pit bottom, 1,950 ft. below the surface, was 66°. This was ascertained by placing a maximum-and-minimum thermometer, protected by a metal case, in a bore-hole driven 10 ft. in freshly cut coal. The hole was closed with clay, and left for various periods from 1 to 14 days. Repeated experiments gave the same results, all observations showing an increase, in undisturbed strata, of 1° F. for every 110 ft. of descent below 65 ft. of the surface.

The foregoing facts, and the records of the various tests, brought the following conclusion: The observations made more than 20 years ago give an increase of 1° for every 64 ft.; recent American tests give an increase of 1° in every 101 ft.; tests made in the Midlands and South Staffordshire, from the years 1880 to 1900, give an increase in temperature of 1° in every 110 ft. It may be taken safely that the mean average temperature of stratified rocks will lie somewhere between the two extremes. The great variation of temperature is difficult to explain. It may be better understood if one takes the results in regular order, and considers the various causes.

Chemical Causes.—It is well known that pyrite readily decomposes with oxygen, evolving heat; rocks containing pyrite record a higher temperature than any non-pyritic rock would show. Under this head should be included the alteration of such rocks as contain copper or iron pyrite, with percolation of water, or atmospheric oxygen, in the fissures or lines of fault inducing chemical action.

Mechanical Causes.—Heat is generated where any rock movement takes place, along lines of fault, or in districts where mining has affected stability. The experience of mining operations has shown to what degree a coal-seam can be heated by pressure and mechanical action, though it is scarcely possible to completely differentiate heat produced by chemical activity from that produced by mechanical force. At two places in a main road where the temperature in a 10-ft. bore-hole was 66° in 1891, in 1898 it had risen to 83°, reaching 90° finally.

Proximity of springs of hot or cold water must influence temperature. Again, many variations will follow the physiographic character of a district, as inclined strata, curved and foliated beds, cleavage planes, stratification, jointed strata, limestone, metamorphic rock, rock which is silicious or basic. Each of these contributes a chapter of variety in thermal phenomena.

In the paper by J. S. Haldane and the author (Oct., 1898), it was shown that the temperature of the air of the mine increases with diminution of oxygen; experience has shown that, in a temperature of 80° or 90°, and in an atmosphere with a loss of oxygen equal to one-twelfth of the whole, to which is also added a large amount of moisture, it becomes a physical impossibility for a man to do a good day's work. Perspiration is great, breathing is difficult, and the lack of oxygen causes sluggishness; this applies both to man and beast.

In thick coal mines, this increased heat is one of the causes of fires; and in mines worked long-wall, where slack is left in the goaf, few fires would take place if the heat could be brought away as quickly as it is generated, for the ignition temperature would not be reached.

It is evident, from the facts now available, that in nearly all cases the rock is cooler, not so hot as the air of the mine, and that, as engineers, our endeavor must be to get cool air down in larger volumes. This brings us to the future planning of the shafts of large collieries at great depths. It was thought 20 years ago that a shaft-diameter of 15 ft. was quite enough, but where the coal is more than 1,500 ft. down the shafts should not be less than 20 ft. in diameter, and the ventilating apparatus correspondingly larger, enabling more air to pass. This would mean a large increase in the capital account, and correspondingly increased depreciation charges. Also, very large areas of coal would be required to justify the outlay. It may be urged that the giving of more air, and consequently more oxygen, would result in more fires in a coal favorable to spontaneous combustion. To the author it is a puzzle that many cases of fire have occurred where 80,000 to 90,000 cu. ft. of air per minute were passing; but such cases have been few as compared with those that occurred where not so much air was supplied; or, as in a return airway, having 70° to 80° temperature.

The author, in conclusion, emphasizes the following points: (1) The difficulties of sinking and working at greater depth would be no doubt easily overcome, as far as mechanical power is concerned. By the more extensive application of electricity underground, the problem of power-transmission, to the greater distances necessitated by the larger areas, would be surmounted. (2) The heat of the rocks will not be so great as was anticipated, probably not more than 1° for each 120 ft. (3) The temperature of the air can be reduced by larger shafts and better ventilating machinery. (4) With better ventilation, men will be able to work as well at a depth of, say, 3,000 ft., as at 1,000 ft. The more general adoption of coal-cutting machinery, which relieves the miner of much of the hardest work, will enable men at great depths to give all the superintendence necessary to the working of machinery. It is my opinion that one should be able to reach any depth at which workable coal is likely to be found in Great Britain, and to work the same. It will be a question of capital outlay, and competition of deep mines with shallow ones; but a great deal can be overcome by large output, and also by working the mine day and night, for herein is one of the greatest losses we have to contend with. Often the large amount of capital in coal-mining enterprise is used only eight or nine hours out of the twenty-four; this means that the dead charges eat up profits. Whereas, if we could work, say, sixteen hours, the dead charges would be greatly reduced.

*Abstract of paper read before South Staffordshire and East Worcestershire Institution of Mining Engineers.

High-Tension Systems for Mining Purposes.

By George E. Walsh.

The value of electric power for mining purposes, when large current can be cheaply generated by harnessing mountain streams, is illustrated in California on the line of the American River Electric Company, located on the South Fork of the American river, 6 miles from Placerville. The power is all generated from the waters of the streams and lakes which find their sources in the Sierra Nevada. While an 80-mile transmission line is run from the mountains to Stockton and Sacramento, the most important line for mining purposes is a 30-mile transmission circuit to Folsom. At various points along both of these transmission lines, mining companies have sprung into existence through the stimulus given to dredging and mining by the supply of cheap power.

The electrical line runs through a rich mining region. The Folsom line terminates in one of the richest gold-producing sections of the Pacific Coast. The soil at this place is composed of a gravel deposit. Further up among the mountains the Mother Lode extends, but the washing down of the gravel deposits has formed gold-bearing deposits in the valleys. The presence of this gold-bearing gravel was known before any systematic attempt was made to recover the precious metal, and the few early attempts made by old methods proved unprofitable.

It was only when electric power in large quantities was introduced in the region that profitable working of this deposit suddenly converted the region into a successful mining section. So important has the mining development proved that the entire output of the electric current at Folsom is contracted for by the Folsom Development Company, which is devoted almost entirely to mining operations in the vicinity.

The Folsom sub-station is equipped with machinery for handling and distributing the high-tension current that comes to it from the power-house located 30 miles away. There are four 300-kilowatt transformers for receiving and stepping down 30,000 volt current to 4,400 and 2,200 volts. Three 100-kilowatt transformers are also installed for stepping down the high-tension current to 11,000 volts. Current in almost any quantity can thus be obtained for driving the dredging machinery, pumps and stamps. The company has five dredges in operation here, and is planning to have a dozen more installed.

The electric dredges are of the New Zealand type, but have been improved in many ways. They are operated entirely by electric power drawn from the long-distance wires of the American River Electric Company. The largest of the dredges operating in the valley around Folsom is worked by a 150-h.p. motor, but most of them have 75 and 100-h.p. motors for working the chain of buckets. The variable speed induction motor is employed, and it drives the large belt carrying the buckets and the drum for raising and lowering. The chain buckets scoop up the soil from five to fifty feet below the surface, and the dredgers are rated according to the size of their buckets. So complete are these dredges that every part of the process is automatically performed, and at a cost of less than $5 per year per horsepower for the electric current.

Pumps of large size and capacity are needed for these dredges. A 50-h.p. motor, using 2,200 volts, is direct-connected to a centrifugal pump, which throws a steady stream of water where needed. The screens are operated by a 30-h.p., 440-volt motor, and another 20-h.p., 440-volt variable speed motor drives the deck winches used for moving the position of the boat.

On one of these gold-dredges there is a total of 233 h.p. for controlling and operating the different parts of the mechanism. This power is divided into six powerful motors, including those already described, a small motor for operating a deck pump, and a larger one for the centrifugal pump to force the sand through a long pipe to the rear. The boats are lighted by over a hundred electric lamps, which are so distributed that the work of dredging can be carried on at night. The exterior work where the buckets dig into the pit is illuminated by powerful reflectors or searchlights. The operator can direct the rays of the searchlight to any part of the field needed. A single operator has everything under complete control. A switchboard is located near him, and he can control the buckets, winches, screens, pumps and belts. He can throw more light on his work, or direct the searchlight to the conveyor belt in the rear or to the mass of tailing piling up behind.

One of the recent improvements in this mining region is the portable sub-station. The sub-station at Folsom receives the high-tension current and transforms it down to 4,400 or 2,200 volts. The current is then carried to the dredges, where a transformer located on the boat reduces the voltage from 2,200 to 440 volts. One large dredge carries three 30-kilowatt transformers. The cable which carries the current from the nearest pole to the boats is tested to 10,000 volts and is insulated with special reference to its work.

The construction of the portable sub-station gives the dredges more freedom of operation and enables the operator to change his position with less trouble. This transformer house is mounted on an ordinary street-car truck, and by laying a temporary track it can be taken to any part of the region needed. There are three 50-kilowatt transformers in this portable sub-station, and they reduce the 11,000 volts to 1,200 volts for the different dredges. The employment of this portable transformer has increased the range of work of the dredges, so that others will probably soon be built.

In addition to this improvement, a portable compressor plant has also been put into the field for operating drills and repairing machinery. The Folsom Mining Company has constructed its own repair and manufacturing plant, and in the future will attempt to build its own dredges on the spot. The portable plant consists of a 10-h.p. 440-volt motor belted to a compressor. This is mounted on a wagon, and can be carried to any part of the mining region.

The repair and construction plant, operated by electric power, will undertake the building of nearly all parts of the dredging machines. The machine shop, which has been in operation for some time, has electrically driven drills, hammers, lathes and grinding machinery. The foundry work is done at Sacramento, but nearly all the rest is done on the spot.

In addition to the development of Folsom and the neighboring mining regions, the long-distance electrical transmission company is endeavoring to open up new territories in other directions. Along the line of the Stockton and Sacramento circuit they have already run short spurs to supply mines with power. All through the lower foothills mining camps are located, and the cost of power from coal, or even fuel oil, has handicapped them. The result has been that many mines and claims have practically been abandoned, and others have never been worked at all. The mere cost of pumping water for mine uses has been greater than the companies could afford. Other mines that are flooded a part of the year could be unwatered only at considerable expense. With cheap electric power distributed through the region, the country is changing and undergoing great improvements. Wherever the high-tension electric lines run, mining camps are springing up, and the demand for current rapidly absorbs all that the generating company can produce.

The probable value of the effective temperature of the radiating surface of the sun is 6,000° C.; and the minimum value for the sun's center is perhaps 5,000,000 degrees.

The presence of metallic zinc or zinc sulphide in zinc oxide can be determined by rubbing several grains in an agate mortar with half a grain of iron (ferric), alum and dilute sulphuric acid, to which is added a single drop of potassium permanganate; decolorization of the latter indicates metallic zinc or zinc sulphide, or both.

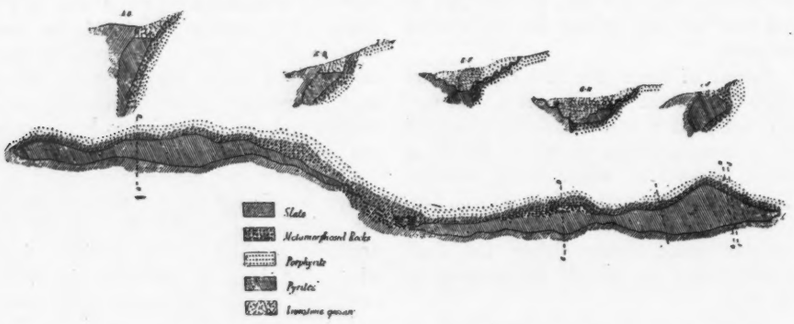
Rio Tinto.*

By J. W. Gregory.

The Rio Tinto district lies between Huelva and the Sierra Morena, in southern Spain. The chief mines are at Tharsis, which is 29 miles northwest of the town of Huelva, and at Rio Tinto, which is about the same distance to the northeast.

The geology has been described in fullest detail by Gonzalo y Tarin.[1] The mineral region of Huelva province consists of a belt, 20 miles wide, crossing the northern part of the province from east to west. This belt consists of Silurian and Carboniferous rocks, traversed by many parallel intrusions of igneous origin. The basic members of the igneous series are described as diabase, and the acid members as quartz-porphyrite and quartzless feldspar porphyrite. The quartz-porphyrite at Rio Tinto is described as of a bright green color and with an "euritic paste."[2] Some intrusive masses of granite, syenite, and diorite occur in the Archean rocks, north of the mineral belt. The whole of the igneous rocks, according to Gonzalo, are intrusive and of deep-seated origin. He calls them *hipogenica,* and describes them as surrounded by aureoles of highly altered metamorphic rocks. De Launay also has described the igneous rocks, but he practically agrees with Gonzalo. He terms the acid intrusive rocks (Gonzalo's *porfidos*) "microgranulites, passing to a petrosilicious porphyrite." Klockmann, however, gives a very different account. He describes them as in part truly eruptive, and containing many beds of volcanic tuff. He says there is a complete transition from schist to tuff, much as there is a transition at Mount Lyell from the Mount Lyell schist to the Queen River porphyrite. Klockmann stated that "a great part of what Gonzalo termed metamorphic Silurian and Culm, and of what he showed as a regular border round the eruptive rocks, is nothing else than tuff or normal sediments mixed with ashes."[4]

The Silurian rocks—Upper Silurian of the older nomenclature—are in the main greywacke, and various varieties of slate and phyllite, with subordinate bands of limestone and quartzite.[5] The Carboniferous belong to the Culm, which is the lower part of the system. The typical rocks are described by Gonzalo[6] as "essentially argillaceous slates, with the layers more or less coarse, and greywackes with a compact or slaty structure." The Carboniferous rocks of Huelva are divisible, the lower members being similar to the Silurian; they are also penetrated by diabase and quartz porphyrite, which have produced in them a metamorphism similar to that observed in the Silurian formation.



Plan and Cross Sections of the San Dionisio Lode, Rio Tinto.

The Silurian strata form a continuous band along the northern margin of the mineral district; but further south they occur in two highland areas, separated by the Carboniferous, which occupy the valley of the Oraque river.

North of the mineral belt there is a band of gneiss, crystalline schist, and other Archean rocks, which form the Sierra de Aracena. They are flanked by a continuous formation, the age of which is known to be Silurian, as it has yielded several species of *monograptus.* This Silurian outcrop is succeeded to the north by rocks which have been determined as Cambrian, for, though they have themselves yielded no fossils, *archaeocyathus* has been found in similar beds further east, in the adjacent province of Seville.[7]

The pyritic deposits occur in the neighborhood of diabase and porphyritic intrusions. The orebodies are lenticular masses ranging up to a mile and a half in length, and from 65 to 500 ft. wide. Their number is about 50, and their bulk colossal. The quantity of ore in the various lodes has been estimated at 1,300,000,000 tons.[8] The orebodies are said to occur in both the Silurian and Carboniferous strata. The mines of Tharsis, of San Domingos in Portugal, of El Carmen, Las Cabezas del Pasto, Coronada, and El Tinto occur in Silurian rocks. The mines of Rio Tinto, La Zarza, La Poderosa, etc., on the other hand, are described as occurring where Carboniferous rocks have been metamorphosed by the inclusion of the quartz-porphyries. Fossils characteristic of the Culm period are found at Rio Tinto[9] in slates closely associated with the altered rocks alongside the porphy-

VIEW ON NORTH SIDE OF OPEN CUT, RIO TINTO.

* Abstract from *Proceedings* of the Australasian Institute of Mining Engineers, Vol. I, No. IV, July, 1904.

[1] Gonzalo y Tarin, 'Descripcion Fisica, Geologica y Minera de la Provincia de Huelva,' Mem. Com. Mapa Geol. España, Vol. I, 1886; Vol. II, 'Descripcion Minera,' 1888.

[2] Gonzalo, *op. cit.*, Vol. I, p. 643.

[3] He says they "repond à des microgranulites, et ces sont en effet des microgranulites passant au porphyre pêtro-siliceux." De Launay, 'Mémoire sur l'Industrie du Cuivre dans la Region d'Huelva,' *Annales des Mines*, ser. 8, Vol. XVI, 1889, p. 466.

[4] Klockmann, F., 'Uber die Lagerartige Natur der Kiesvorkommen des südlicher Spaniens und Portugals,' *Sits.* K. Preuss, Akad. Wiss., Berlin, 1894, pp. 1176, 1177.

[5] Gonzalo, *op. cit.*, Vol. I, p. 397.

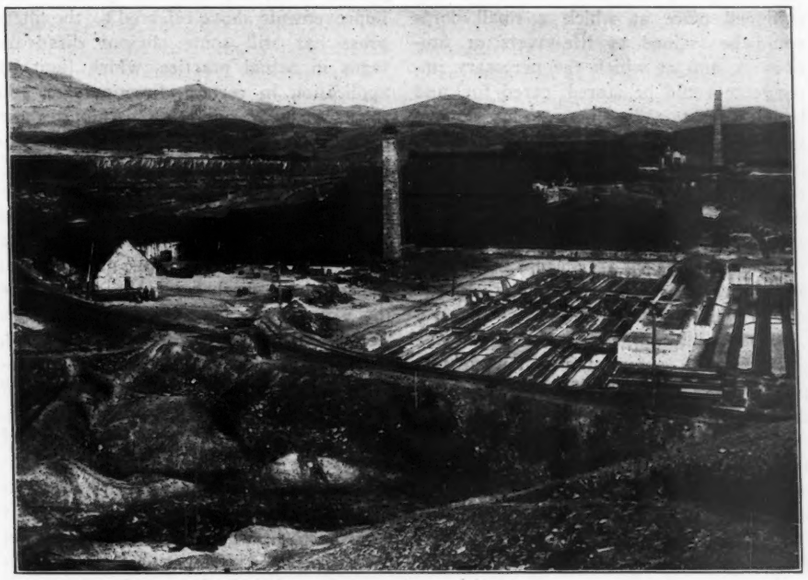
[6] Gonzalo, *op. cit.*, Vol. I, p. 493.

[7] Gonzalo, *op. cit.*, Vol. I, pp. 366, 367.

[8] Gonzalo, *op. cit.*, Vol. II, p. 7.

[9] Gonzalo, *op. cit.*, Vol. I, p. 498.

ries. The evidence of the metamorphism of the Carboniferous as given by Gonzalo is not satisfying. It does not wholly allay a suspicion whether the metamorphosed beds may not all be of pre-Carboniferous age, and their apparent passage into the fossiliferous slate be due to the extensive faulting, which has taken place in the mineral belt of Huelva.



SULPHATE OF COPPER PLANTS AT RIO TINTO.

The pyritic deposits consist, in the main, of pyrite with copper pyrite, which is sometimes developed in strings, branching through the mass. Some smaller strings of copper glance also occur. The pyrite frequently exhibits a stratification parallel to the country. The ore contains from 20 to 25 dwt. silver per ton, with a minute proportion of gold.

Courtney[10] gives the following as the average composition of the two chief types of ore, and of the copper-bearing schist:

Ores.	Copper-bearing Iron Pyrite.		Cupriferous Schist.
	Export ores.	Local treatment ores.	Local treatment ores.
Iron	43.1	42.8	0.10
Sulphur	49.5	48.3	0.15
Copper	2.5 to 3.0	1.5 to 2.0	1.0 to 1.25
Lead	0.3	1.3	.....
Zinc	0.8	1.8	0.05
Arsenic	0.4	0.7	.....
Water	0.5	0.8	3.15
Silica	0.6	0.7	93.6
Oxygen and various metals	1.2	1.1	.....
	99.4	99.5	98.3
Specific gravity	4.5	4.5	2.25

The course of the lodes, or *criaderos*, as they are called at Huelva, is marked by gossan, the nature of which has been a matter of controversy. The pyritic bodies are variable in shape and geological position. Their characters can best be illustrated by the following typical cases:

The western lode of Rio Tinto, or *Criadero de San Dionisio*, is about 7,500 ft. long, and as much as 420 ft. wide. It lies along the junction of the slate and the porphyrite. The pyrite includes copper, lead, and zinc sulphides, and it is traversed by veins, from 4 to 8 in. thick, of chalcopyrite and copper glance. In section G H a thick mass of pyrite rests with a flat base on an underlying shelf of altered porphyrite.

The Tharsis orebodies are contained wholly within Silurian slate. In some places a horse of slate occurs between two bands of gossan, while elsewhere the gossan and lode are of the same width. The pyrite lode of La Peña del Hierro, about two miles northeast of Rio Tinto, occurs on the junction between much altered slate (said by Gonzalo to be Lower Carboniferous in age) and the altered porphyrite. The lode is bounded by two nearly vertical straight boundaries; the aspect of these boundaries resembles fault planes rather than lines of intrusion. The sections certainly suggest that the boundaries of the pyrite are fault lines, and sections across Rio Tinto[11] show that fault action has been strongly developed there. The lustrous phyllite, which occurs between the southern lode and the Culm beds, may indeed be part of the Silurian rocks brought against the Culm by faults.

The mine of La Chaparrita is close by that of La Peña; the pyrite occurs in short vertical lenticles, at the junction of the altered porphyrite and slate. Toward the southeastern end the lode is a simple, almost vertical lenticle; northwest it increases in width and finally forks; in one part of the lode the foot of the pyrite mass projects into the porphyrite, while above, it ends in two gossans, separated by a band of slate; further north the lode increases in width to 80 ft., and it is capped by three bands of gossan separated by two blocks of schist, while at the northern end the lode has become much thinner and divided into fin-like processes, which do not quite reach the surface.

Another case of the thinning out of a pyritic mass above is afforded at Las Cabezas del Pasto, where the lode is entirely in Silurian slate. The lode suddenly contracts above and is connected to the surface by a narrow gossan. According to

ROAST HEAPS AT RIO TINTO.

[10] C. F. Courtney, 'Mining and Treatment of Copper Ore at Tharsis, Spain,' *Proceedings* Civil Engineers, Vol. CXXV, 1896, p. 129.

[11] Gonzalo, *op. cit.*, Vol. I, pp. 500, 501.

Courtney, the same feature occurs at Tharsis.

There are two rival theories explaining the Rio Tinto deposits; according to Roemer[12] (1873 and 1876), von Groddeck (1879), and Klockmann[13] (1894), the ore is of sedimentary origin and conformable to the surrounding slate. Gonzalo y Tarin, on the other hand, holds that the deposits are veins or lodes formed by the infiltration of minerals in solution. De Launay[14] (1889), Courtney[15] (1896), and Vogt[16] (1899) agree generally with this interpretation. The evidence is certainly in favor of the view that these pyritic masses are metasomatic in origin, and that they have been formed as replacement lodes by infiltering solutions. The trace of stratification which led to the idea that they were bedded deposits is probably only a pseudomorphic relic, which indicates that the pyrite has replaced sedimentary beds. The ore deposits are not normal contact deposits, because, (1) whichever authority on the field we accept, the ore was clearly formed long subsequent to the formation of the igneous rocks beside them; (2) because in other cases they occur in slate and not along a contact line; (3) and in several cases in which the ore does occur beside the igneous rocks, it appears as if the junction between the porphyrite and slate by the lodes is due to faulting. In spite of the considerable literature upon Rio Tinto, the mode of occurrence of its ores still requires more detailed geological and petrological description; and if Klockmann be correct in his account of the igneous rocks and of the rocks described by Gonzalo as metamorphic, the contact theory of the ores is no more tenable at Rio Tinto than it is at Mount Lyell.

The absorption spectrum of iodine is very complicated, having over a hundred bands, which further analysis shows to consist of several thousand lines. This spectrum in a small spectroscope has a picket-fence appearance, from the number and regularity of the bands.

As metallic cadmium is precipitated quantitatively from its solution by metallic zinc, so also can the former metal be precipitated by metallic aluminum in the presence of a trace of chromic nitrate. Carl Goldschmidt, of Luzern, is authority for the statement, which constitutes an important addition to analytical method.

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[12] *Zeitschrift* des Deutsches Geologische Gesellschaft, 1873 and 1876.

[13] Klockmann, 'Uber die Lagerartige Natur der Kiesvorkommen des sudlicher Spaniens und Portugals,' *Sits.* K. Preuss, Akad. Wiss., Berlin, 1894 pp. 1,173-1,181.

[14] De Launay, 'Mémoire sur l'Industrie du Cuivre dans la Region d'Huelva,' *Annales des Mines*, ser 8, Vol. XVI, 1889, pp. 427-515.

[15] C. F. Courtney, 'Mining and Treatment of Copper Ore at Tharsis, Spain,' *Proceedings* Institute Civil Engineers, Vol. CXXV, 1896, pp. 126–144.

[16] J. H. L. Vogt, 'Der Huelva Kieseld in Südspanien und dem angrenzenden Theile von Portugal,' *Zeitschrift für Praktische Geologie*, 1899, pp. 241–254.

The Work of a Joint Colliery Rescue Station.*

By M. H. Habbershon.

In 1901, the writer advocated the installation and maintenance, at a central point within a group of collieries, of a suitably equipped office at which a small corps could be trained as life-savers or firefighters, and at which the necessary implements could be stored, cared for, and kept in constant readiness. This suggestion has been followed out by three North of England companies whose collieries are contiguous, who have erected such a station, obtained a supply of apparatus, principally pneumatophores, or portable air-renovators, engaged an efficient instructor, and have been drilling volunteers in the use of the paraphernalia.

Meyer's latest pneumatophore, the apparatus used, shows the following improvements: (1) The helmet has been discarded and a simple mouthpiece and nose-clasp substituted for it. This lessens the heat and the weight, thus removing the causes of headache, and makes it possible to see and hear distinctly and to converse. The choice between the two forms is, however, largely a matter of preference, and either can be had. (2) Caustic, for the absorption of carbon dioxide, is used in dry kernels instead of in solution, as formerly; (3) a regulating valve adjusts the admission of oxygen to the requirements, about 122 cu. in. per minute, the cylinders, when fully charged, providing about two hours' supply; (4) a relief valve by which an accumulation of gas in the breathing-bag can be discarded; (5) the exhaled air is injected into a spherical enlargement of the breathing-tube, to which the oxygen is also admitted, thus ensuring a thorough rejuvenation of the vitiated air; (6) the revivified air is circulated through a cooling tube. The apparatus weighs 33 lb. 11 oz. complete, in its leather case.

Only about 20% of the men experimented upon proved able to breathe through this apparatus continuously for two hours, and then only after repeated practice. The exercises consist in trundling light wheelbarrow loads, first in the open air, and then in a room filled with a noxious atmosphere. The men are then tested at laborious work underground, such as carrying a person on a stretcher along old passages, sometimes not more than 3.5 ft. high, and obstructed by falls.

Experience indicates that, if the idea is adopted, it must be carried out systematically and thoroughly. Means must be employed to keep the apparatus in constant readiness, and a small corps in steady training, because the implements deteriorate with disuse, and without an intimate knowledge of the details of his work, an operator can be of no service.

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*Abstracted from the *Transactions* of the Institution of Mining Engineers. Vol. XXVIII, Part 2.

The Ogle Continuous Filter.

The use of filter-presses has of late become extended. The improvements in design and increase in size have allowed such moderate working costs that filter-pressing has become profitable in many industrial operations. In spite of the improvements above referred to, the filter-press has still some obvious disadvantages in actual practice, which limit its application in certain directions, or add to its cost of operation. Among these disadvantages may be mentioned the following:

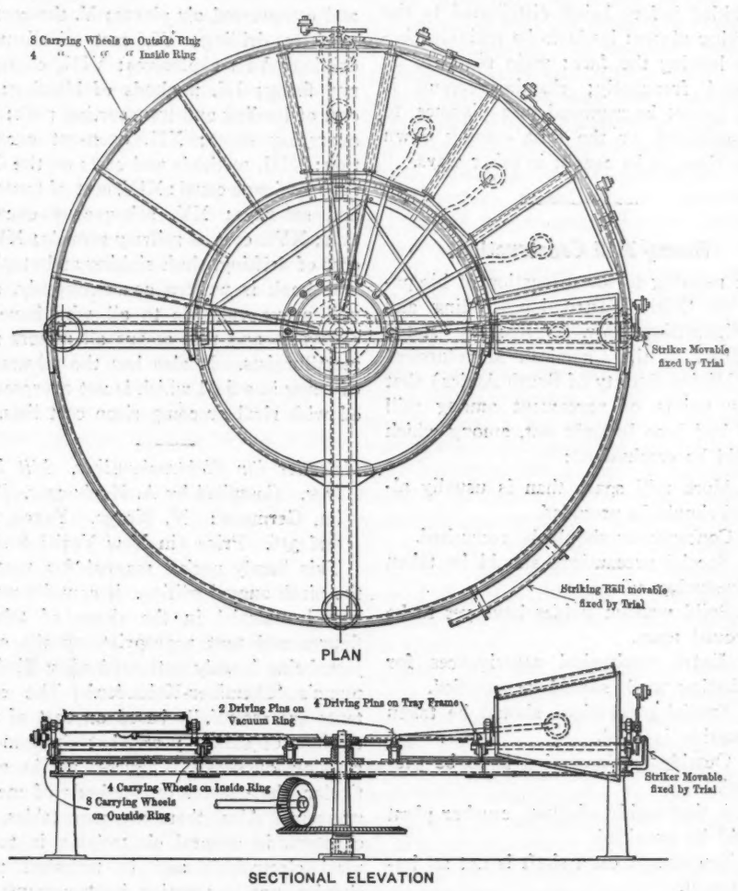
For a large capacity, the cost of installation is high, and for a small output the cost of operating is high; even with a large installation the labor and time of charging and discharging the press make the expense of working relatively large. To obtain the full capacity of the press, it is necessary to produce thick cakes before discharging, and the production of thick cakes necessitates high pressures, with a consequent large wear and tear of filter-cloths and, in cases, imperfect washing. Proper attention to the frequent adjustments of filter cloths and plates is requisite to prevent leakage and imperfect filtering. A recognition of the disadvantages and limitations of the filter-press has led to many inventions in the line of filters, presses, and centrifugal machines with a view to getting some cheap and effective continuous discharge system.

Mr. Percy J. Ogle, among other inventors, after devoting much study and actual experiment to the subject, has now perfected a continuous discharging vacuum filter, which can be applied to all material on which filtration is possible, and the following brief description will show its principle and simplicity of construction, and remove any doubts as to its effectiveness. The principle involved in the operation of the machine is that of a traveling filter surface, subjected to a vacuum below the cloth, and working with comparatively thin layers of the material to be dried. By the employment of this principle a very large capacity can be obtained from a machine occupying small floor space, taking very little power, and reasonable in first cost. The pressure of the atmosphere is sufficient, with thin cakes, to produce all the drying effect which is required in practice on practically all materials likely to be treated by filter pressing; and a continuous delivery of the cakes gives a large capacity, in spite of the cakes being thin.

A series of 16 hollow filter trays suspended on trunnions, and covered with filter cloth of the proper material, are arranged in a circle on a revolving light iron framework, which is carried by small wheels running on a circular track. A sheet iron lip on the back of each tray overlaps the following tray (without preventing the trays turning over on their trunnions when required, by the operation

of the machine) so as to form what is practically a revolving filter table.

Each tray below has a flexible connection with a hollow guide sliding air-tight over a hollow circular track, where it is connected with a vacuum pump. The trays are provided with attachments which, at one point of the complete revolution of the machine, tip over each tray on its trunnions, and thus force it to drop its charge of dried cake into a hopper, car or continuous conveyor, as may be required for disposal of the finished product.


8 Carrying Wheels on Outside Ring
4 " " " Inside Ring
Striker Movable fixed by Trial
Striking Rail movable fixed by Trial
PLAN
2 Driving Pins on Vacuum Ring
4 Driving Pins on Tray Frame
Striker Movable fixed by Trial
4 Carrying Wheels on Inside Ring
8 Carrying Wheels on Outside Ring
SECTIONAL ELEVATION

OGLE REVOLVING FILTER.

In operation, the series of 16 trays, each with a surface of about 8 sq. ft., slowly revolves, making one complete round trip in about three minutes. A continuous stream of the material to be filtered flows on to each tray at one point of its travel; the stream being regulated to give a full charge to the tray while it passes under the inflow. The tray is then automatically subjected to the full vacuum suction from its connection with the suction guide-ring, and this suction continues during such portion of the complete revolution as may be necessary. If a fairly thick cake is obtainable and no washing necessary, a second flowing on of original material can be arranged for. If, in the case of cyaniding gold slime, a wash of weak solution is advisable, the tray passes under a stream of such solution; and this can be followed with a regulated flow of wash-water to displace all solution. Just before reaching the point of first inflow of original material, each tray is automatically tipped with a slight jar by striking a stop, and the dried cake on its filter surface then drops off. If there is any difficulty in detaching the cake cleanly, a slight puff of air is admitted automatically into the tray beneath the filter cloth, just as the tray is turned over, and effectively detaches the cake. The machine can be regulated to all requirements by the speed of revolution, quantity and points of inflow of material, points of addition (if any) of wash-water, and points of revolution at which suction is applied or discontinued.

The great variety of adjustments afforded by the construction described will make the machine applicable for all filtering purposes, and a little calculation will show that even with the production of cakes as thin as 0.25 in. a great capacity can be attained. For example, a machine of the size described, about 17 ft. in diameter over all, working on very fine gold ore slimes with production of cakes of only 0.5 in. thickness, subjected to a second solution, and final wash-water to displace this, would handle 90 tons of dry slimes per day of 24 hours; this with merely general supervision and no labor.

Among the uses to which such a filter is applicable are the handling of all precipitated products of a character difficult to treat. The filter, which is shown in the accompanying drawing, is made by Fraser & Chalmers, Ltd., in London.

Affinity and Pressure.

We often hear much of the theory of pure science; but, as a matter of fact, in many instances, fact and experiment are up to date, while the attendant theory halts far behind the time. To illustrate: we laugh at the ancients for speaking of the attraction and repulsion of the atoms as their love and hate; but we in our common ignorance use exactly the same speech in chemistry when we speak of 'affinity'; for it needs only a moment of reflection to be reminded, and with mortification, that the word affinity is the old word 'love' masquerading as a modern aristocrat. Further examples are available, but they are not needed; we advance directly to the positive view. In electricity we are impressed with the use of phraseology and formulæ which directly imply pressure. Ohm's law is only a naive confession and insistence of this. In physics and chemistry, we note the increasing tendency to explain phenomena by this same electrical simile and metaphor. The kinetic theory of gases is only a phase of thermo-dynamics; and Arrhenius' dissociation theory is only an extension of the kinetic theory of gases to the kinetic working of liquids. Nernst's solution-tension, an incident which anticipates much and of which much will be heard later, postulates a large problem. Why does a solid metal displace the fixed hydrogen of an acid, occasioning a large volume of gas, even under great pressure? And why can this pressure be made, in some cases (the noble metals), to work backward? Truly, it begins to look as though we were surrounded by an all-pervading atmosphere of pressure; pressure of heat, of light, of electricity, of magnetism, perhaps of chemism. Gravitation is another agency which has approximately eluded every attempt at reduction to direct experiment; but the outlook is as promising as it is vast. We read with interest of the mystery attending the discovery of the air-pump, and of the difficulty that scentific men experienced in grasping the fact that we are immersed in an atmosphere that presses, in and out, up and down, here and there—with 15 pounds on every square inch at sea level. But what will our feelings be if the present tendency should materialize in new pressures, chemiferous, electriferous, and thermiferous; which can be counted only in hundreds-of-atmospheres to the square inch? And what is the seat and origin of these pressures? "Matter and motion," said Clerke Maxwell.

Colorado Coal.

The biennial report of John D. Jones, State coal mine inspector, covering the two years 1903 and 1904, is now available. Labor troubles in that State have had two malevolent influences upon the industry—they have diminished production and have made fatal accidents become more frequent, owing to the necessity of employing unskilled workmen. A brief summary of the statistics for both years follows:

	1903.	1904.
Mines in operation	160	175
Lignite	1,176,248	1,238,187
Bituminous	6,420,090	5,352,960
Anthracite	48,964	55,404
Unclassified, estimated	130,000	130,000
Total production	7,775,302	6,776,551
Coke ovens	3,233	3,376
Coke produced	778,238	591,351
Employees at mines	10,296	10,769
Employees at ovens	1,350	914
Fatal accidents	40	89
Ratio per 1,000	4.0	8.3

Las Animas county produces nearly half of the whole output, Huerfano being the next in order. All of the anthracite comes from two mines in Gunnison county.

The Prevention of Coal-Dust.

A paper by W. H. Pickering, the retiring chief inspector of mines for Yorkshire, was read before the Midland Institute of Mining, Civil and Mechanical Engineers, of which the following is a condensation: The danger in allowing an accumulation of coal-dust has long been understood, but thus far, its only official recognition has been the introduction of provisions into the British Coal Mines Regulation Act, which govern the use of explosives in dry and dusty places. Permitted explosives are only relatively safe, and it must not be overlooked that coal-dust fires can result from many other sources, particularly firedamp explosions. Fires are known to have been set by sparks from brake rims and heat from journal bearings.

Dust made in the working faces and along the tributary roads is not particularly dangerous, being mingled with much clay dust, and very little dust is found in return air-ways. The dangerous places are at the bottom of the downcast shaft and along the main haulage roads, where pure coal-dust, of extreme fineness, collects in abundance. It rattles from the cars, is blown off the loads by the opposing air current, and comes down the shaft from the screens on which the product is cleaned, which process British ingenuity has not yet succeeded in displacing from its time-honored position over the pit mouth.

Methods heretofore employed consisted in the abundant use of water, either sprinkled over the floor, roof and sides of passages or around the foot of the shaft, or sprayed into the atmosphere. Both methods present grave difficulties. In many cases the liberal use of water would cause the floor to creep and the roof to cave, while the bad effects of a humid atmosphere in a warm mine, upon men and timbering alike, is well known.

The author suggests the following remedies, to be used in conjunction, which are designed to reduce the scattering of dust, cheaply, and without using great quantities of water: The sides and bottoms of cars to be dust-tight; loaded cars on main haulageways to be sprinkled before starting out; empty cars to be sprinkled before being distributed to the working places; loads to be sprinkled before leaving the face; main roads to be cleaned frequently; cleaning-screens, if they cannot be removed to a distance, to be sprinkled, or the dust coming down from them to be caught in other ways.

Stamp Mill Construction.

In replying to the discussion of his paper on 'Mill Construction, Milling and Amalgamation,' Mr. I. Roskelly stated (*Journal* of the Chemical, Metallurgical and Mining Society of South Africa) that many points of agreement among mill men had been brought out, among which should be emphasized:

1. More mill space than is usually allowed should be provided.
2. Concentrates should be recrushed.
3. Special precautions should be taken for reducing vibration.
4. Solid wooden guides have yet to be improved upon.
5. Extra mechanical contrivances for facilitating work should be supplied.
6. Special precautions should be taken if cyanide is used.
7. Outside amalgamation is to be preferred.
8. A thoroughly adequate crusher plant should be provided.
9. Ten stamps on a shaft is not an improvement.
10. The new Blanton cam is an improvement on keyed cams.

The so-called improved feeders do not, in Mr. Roskelly's opinion, justify discarding the Challenge feeder, but probably an improvement will be made in that, so that the brake-wheel and three pawls can be done away with.

Most contributors to the discussion advocated either the sparing use of cyanide or its total abolition. Mr. Roskelly considers, however, that it merely cleans and brightens the plates and has never found that it hardens amalgam, nor does it dissolve amalgam to any appreciable extent.

Outside amalgamation pure and simple has proved itself to be as good as, if not better than, any other method, and it is the method which reduces losses and risks of all kinds to the minimum. With inside amalgamation the mill-man is working more or less in the dark.

Books Reviewed.

Rock Excavation. By Halbert P. Gillette. New York: M. C. Clark. Pages, 376; illustrated. Price $3.

This treatise on methods and cost of rock excavation was born of the feeling of need for some such authoritative collection of actual experiences. The contents speak a generous scope, as follows: Chapter I, rocks and their properties; II, methods and cost of hand drilling; III, machine drills and their use; IV, steam and compressed air plants; V, the cost of machine drilling; VI, cost of diamond drilling; VII, explosives; VIII, charging and firing; IX, methods of blasting; X, cost of loading and transporting rock; XI, quarrying stone; XII, open-cut excavation; XIII, methods and costs on the Chicago drainage canal; XIV, cost of trenches and subways; XV, subaqueous excavation; XVI, cost of railway tunnels; XVII, cost of drifting, shaft sinking and stoping. The book is written conscientiously, and will prove valuable to all who have to excavate—and that means all miners and metallurgists. It also has the advantage of being in a field which is not overcrowded with rival or comparison cost lists.

Kalender für Elektrochemiker. Mit Beilage. Compiled by A. Neuburger. Berlin, Germany: M. Krayn. Pages, 504 and 336. Price (in New York) $1.40.

This handy pocket manual for 1905 is the ninth annual edition. It contains much useful material in the shape of tables, figures and text appropriate to the subject, being largely patterned after Biedermann's 'Chemiker-Kalender.' The contents are essentially based on that of the editions of earlier years, but show much revision of detailed figures, as, in particular, the chapter on methods of measurement. Also, there are new tables, or chapters, in general electrolysis, in technical electrolysis and in technical mechanics, not to mention improvements in the supplement. The volume has many omissions, as such an ambitious publication must have. It aims to fill a gap, and does so very acceptably; and it goes without saying that all of the material is valuable, and much of it is indispensable to the practical electrician, whether he reads German or not. The book is commended to all who need the ready facts of physics, chemistry and mechanics which serve the electro-chemist. It will find its way to its users.

Eleventh Biennial Report of the State Coal Mine Inspector of Colorado. 1903-1904. Denver: State Printers. Pages, 187, with three plates.

The inspector makes several recommendations, among which are: That the fiscal year should end on June 30, instead of on Dec. 31, thus permitting the distribution of his report at the opening of

the Legislature; that all mines should be sprinkled, whether gassy or not; that the extreme workings of mines about to be abandoned should be carefully mapped for the safety of adjacent mines.

The statistics of production of coal and coke, extracts from which appear in another column, are given in careful detail, the output during each of the two years being segregated under counties and under companies. The Tercio explosion, by which 19 men were killed, is discussed. The mine is absolutely non-gaseous, and only small quantities of powder are taken into it, so that coal-dust is the only other possible explanation, and this in spite of the fact that the roadways were carefully sprinkled. Two blown-out shots in one of the rooms pointed to the origin of the disaster.

Colorado's productive measures are all found in the Laramie stage of the upper Cretaceous. The coalfields are estimated to cover 18,100 sq. miles, of which 2,913 sq. miles are accessible, and to have a gross content of 45 billion tons.

The report then describes all new developments and the improvements at old localities, and closes with a directory of coal mine operators and a collection of the State statutes that apply to coal mines.

Lehrbuch der mechanisch-metallurgischen Technologie. Erste Abteilung. By A. Ledebur. Braunschweig, Germany: Friedrich Vieweg & Sohn. Pages, 400; illustrated. Price (in New York) $4.25.

The appearance of the first volume of the third edition of Professor Ledebur's mechanical metallurgy should mark a point in the history of the science, as this book is a companion volume to the well-known chemical metallurgy by the same author, who occupies a chair at the Freiberg Bergakademie. The treatment bears all the marks of German thoroughness, though it is difficult to review a work *in toto* from the separate volumes which appear at intervals. Although Ledebur has recently (1903) published a separate volume on the metallurgy of iron, this is evidently to consider the mechanical working, not only of iron, but also of all the other commercial members of a list which counts between ten and twenty. In English we have Howe and Campbell on physical and chemical metallurgy, and Harbord and Hall on the mechanical working of iron.

While the principles of metallurgy—physical, chemical and mechanical—are the same in all lands, yet Ledebur evidently aims to describe continental practice, which, in comparison with English and American, is less largely shaped by the application of labor-saving devices, though we must remember that Essen, the home of the Krupp works, and Seraing, famous for the Cockerill waste-gas engine, are in Europe. But Ledebur in this volume does not get far beyond the furnace, the rolls and the hammer. That the whole edition, when completed by the other volumes, will constitute a valuable reference and manual, goes without saying.

Geologic Atlas of the United States. Asheville Folio, North Carolina-Tennessee. Washington: Engraved and published by the Geological Survey. Four maps, one page of sections, ten pages text.

The area, 968.7 sq. miles, covered by this folio, lies near the western extremity of North Carolina, but includes a small triangle in Tennessee. Almost the entire area is extremely mountainous, reaching, in the northeast, an elevation of 4,500 ft. The French Broad river traverses it diagonally, flowing toward the northwest.

Sedimentary rocks, all of Cambrian age, except one member of lower Ordovician, are found almost exclusively in the Tennessee corner, and occupy only one-fifth of the whole area. They comprise conglomerates, sandstones, shales and limestones and their metamorphic derivatives. The remaining area is equally divided between masses of igneous rocks, mainly granites, and gneisses of indeterminate origin, but probably derived from basic intrusions, both granites and gneisses being of Archean age. Dikes of rhyolite, pegmatite, quartz-diorite, basalt and dunite, with its derivatives, talc and serpentine, are found abundantly. Lenticular beds of silicious marble occur in the gneiss, pointing to a probable sedimentary origin for parts of it.

Faults form the most striking feature in the structure of the region. These are not extreme in dip nor in amount of throw, but their courses are most frequently meandering; the outcrop of one fault which encircles Hot Springs traces nearly a complete circumference, enclosing an area of about 26 sq. miles.

The mineral resources of the district have not been systematically developed. Soapstone, talc, chromite and asbestos have been prospected in association with dunite masses. Corundum is found in the same association, although the reason for this fact is not apparent. Barite occurs by itself in veins in the granite masses. Garnet is found thickly scattered through mica-schists, and at a locality four miles southwest of Marshall they are mined for abrasive use. The crystals are of great size. Nickel, as a hydrous-silicate, is found associated with chalcedony in veins intersecting dunite masses. At Webster, large bodies of ore, said to carry 7% nickel, have been opened. No suitable treatment has yet been devised. Magnetite occurs in veins, sometimes of great thickness. Brown hematite is found on the Tennessee side as masses in residual clay resulting from decomposition of the Shady limestone, near its contact with underlying quartzite. The ore is very pure and has been worked in a small way for many years.

Books Received.

In sending books for notices, will publishers, for their own sakes and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Colorado. Eleventh Biennial Report of the State Coal Mine Inspector. John D. Jones, Inspector. Denver, Colorado: State Printers. Pages, 192, with diagrams.

The Diehl Process. By H. Knutsen. London: Reprinted from *Transactions* of the Institution of Mining and Metallurgy. Pamphlet, 22 pages.

The State of Idaho. 1905. Boise, Idaho: Prepared and published by the Bureau of Immigration, Labor and Statistics. Pages, 200; illustrated.

The Testing of Continuous Current Machines in Laboratories and Test Rooms. By Chas. Kinzbrunner. New York: John Wiley & Sons. Pages, 336; illustrated. Price $2.

Report on a Fire and Water Test on Interlocked Plaster Block Partitions. Columbia University Fire Testing Station. New York: Published by the University. Pamphlet, 12 pages; illustrated. Price 25 cents.

The Oldest Sedimentary Rocks of the Transvaal. By Frederick H. Hatch. Johannesburg, Transvaal: Reprinted from *Transactions* of the Geological Society of South Africa. Pamphlet, 4 pages.

United States Geological Survey. Bulletin No. 246. Zinc and Lead Deposits of Northwestern Illinois. By H. Forster Bain. Washington: Government Printing Office. Pages, 56, with maps.

Fifteenth Annual Report of the Bureau of Industrial and Labor Statistics of the State of Maine. 1904. S. W. Matthews, Commissioner. Augusta, Maine: State Printer. Pages, 240.

Map of the New River Coalfield and Adjacent Territory. Scale, two miles to one inch. Kanawha Falls, W. Va.: Compiled and published by Clark & Krebs. Folding map, with cover. Price $1.50.

Jahrbuch der Elektrochemie und Angewandten Physikalischen Chemie. X. Jahrgang. 1903. Compiled by Dr. Heinrich Danneel. Halle-a.-S., Germany: Wilhelm Knapp. Pages, 930; illustrated. Price (in New York) $9.

Bureau of the Census. Bulletins. Lead and Zinc Ore. By Isaac A. Hourwich. Pages, 24. *Gold and Silver.* By Isaac A Hourwich. Pages, 84. *Copper Ore.* By Isaac A. Hourwich. Pages, 38. Washington: United States Census Bureau.

Memorie Descrittive della Carta Geologica d' Italia. Volume XII. I Giacimente di Antracite nelle Alpi Occidentale. Prepared by the Royal Geological Office. Rome, Italy: National Printing Office. Pages, 232, with maps and illustrations.

Conversations on Chemistry. Part I, General Chemistry. By W. Ostwald. Translated from the German by Elizabeth C. Ramsay. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Pages, 256; illustrated. Price $1.50.

Bureau of Fisheries. Bulletin 557. Malaclemys, a Genus of Turtles. By William Perry Hay. Pages, 20, with twelve plates. 558. *The Medusæ of the Wood's Hole Region.* By Chas. W. Hargitt. Pages, 76, with seven plates. 559. *The Osteology and Immediate Relations of the Tile-Fish.* By Frederick A. Lucas. Pages, 8. 560. *The Blood Vascular System of the Tile-Fish.* By C. F. Silvester. Pages, 26; illustrated. 561. *Fish Parasites of the Genus Argulus.* By Chas. B. Wilson. Pages, 16; illustrated. Washington: Government Printing Office.

Dry Air Blast.

In view of Gayley's results in using dry air in the manufacture of iron, O. Boudouard, the eminent French physico-chemist (*Comptes Rendus*, 1905, CXL, pp. 40-42), has made experiments which show that the reducing action of carbon monoxide on ferrous oxide is stronger when the gas is dry than when moist, but the difference, which is very marked when the temperature is 400° to 500° C., decreases as the temperature rises and practically disappears at 1050° C. In the cooler portions of the furnace, consequently, the reducing effect of carbon monoxide is promoted by the absence of moisture, and the resulting carbon dioxide having less tendency at lower temperatures to reaction with coke, leading to regeneration of carbon monoxide, there will be an economy of fuel. In the region of the tuyeres, however, where the temperature is highest, the water of moist gas must decompose into hydrogen and oxygen, and of the subsequent behavior of that hydrogen there is no exact knowledge. In the presence of carbon dioxide, it may regenerate the monoxide and aqueous vapor.

The highest temperature hitherto attained on the earth's crust is probably that produced by Mr. A. G. Himalaya (of Portugal) at the St. Louis Exposition. He concentrated sunlight by 6,000 silvered-glass mirrors on a single frame, and the results seem to be far in excess of the electric arc, every known substance being volatilized. In fact, the intensity of the heat almost limits experiments thereon.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Discovery of Gold in California.

Sir—In the issue of your most valuable JOURNAL for Feb. 9, I find an editorial on 'Mining History in California.' This is a subject in which I have long been interested, and I was surprised to see you reiterate that long ago exploded story that "The *original* discovery of gold in California was made at Sutter's Fort, near Coloma." This, of course, refers to Marshall's so-called *first* discovery of gold in 1848. This statement as to the *original* discovery of gold is entirely incorrect. I have not time at this writing to go extensively into this history, as I start for California to-morrow to be gone six weeks on mining examinations in that State.

Sufficient to say that the first discovery of gold in California was made in 1833 at the San Francisquito placer mines in Los Angeles county, by Francisco Lopez. I have in my office the historical evidence of that fact, with manuscript statements from "the only people who can furnish the facts desired—the miners who were in the county in early days," as you state in your editorial. These facts I gathered from just such men while I was in direct charge of all the placer mines embraced in the San Francisquito Castaca, and San Feliciana properties in Los Angeles county in California during 1893.

ROBERT BREWSTER STANTON.

New York, Feb. 10, 1905.

A North Carolina Development.

Sir—The Whitney Company has now under construction one of the most important developments in the South. It has purchased over 15,000 acres of land, comprising the largest mining, granite and water power properties in North Carolina. The construction now going on is a large dam with several miles of canal whereby the Yadkin river will be diverted so as to generate some 40,000 horsepower, which will be utilized at their near-by manufactories and at the same time transmitted electrically to adjacent towns, mines and cotton mills. The contract for dam and canal has been awarded the T. A. Gillespie Company, of New York and Pittsburg, at a figure between one and two million dollars.

This company, under the management of Mr. Robert Swan, is now at work in the most vigorous way, waking up the 'sleepy hollow' manner of doing things, down on the Yadkin river, four miles from New London, in Stanly county. They are giving employment to all available men and teams, much to the detriment of mine and farming in that district during this construction work. The cheap power generated will make this section the most desirable manufacturing center in the South. The surface is adapted to the culture of cotton, corn, wheat and fruits, together with forests of pine, oak, hickory, black walnut and other valuable timbers, while there are known veins of gold, silver, and copper bearing ores. The conception of this great enterprise is due to Col. E. B. C. Hambley, vice-president of the Davis & Wiley Bank, of Salisbury, N. C., at one time a prominent English mining engineer, who has taken up his residence in this State, where he is largely interested in mining and other enterprises. He has spent the past five or six years in bringing this undertaking to the present point, at the same time developing his mines with a view to having an enormous tonnage of low-grade gold ore exposed. The mines and quarries have been connected with the Southern Railway, and that in turn with the power plant on the river until, in this preliminary work of five years, they have built 10 or 12 miles of standard track, purchased and developed several large mines and granite quarries and equipped the same.

Mr. George I. Whitney, of Pittsburg, Pa., is president of the company, and is the financial power. Of course this company will reap large benefits from their great enterprise, while the surrounding country will take on new life. This development and transmission will cost some $3,000,000, while the present investments represent nearly $1,500,000. The Whitney Company is incorporated under the laws of North Carolina, with a capital of $10,000,000, and following are the officers: President, George I. Whitney, Pittsburg; vice-president, E. B. C. Hambley, Salisbury, N. C.; treasurer, F. L. Stephenson, Pittsburg; secretary, H. L. W. Hyde, Pittsburg.

The properties owned by the company comprise the following: Farming, timber and power lands on Yadkin river, 10,000 acres; Yadkin mining lands, Montgomery county, 891 acres; Whitney mining lands, Gold Hill district, 876 acres; Reimer mine, Rowan county, 108 acres; Barringer mine, Stanly county, 288 acres; Rowan granite quarry, Rowan county, 340 acres; Yadkin river lands, 2,776 acres. Something over 15,000 acres, all of which will be developed and put to some use.

RICHARD EAMES, JR.

Salisbury, N. C., Feb. 10, 1905.

The Siemens & Halske new incandescent lamp, though not yet as efficient as the ordinary Edison or Nernst lamps, may prove later to be a commercial success. The metal, in spite of its inherently low specific resistance, can nevertheless work at 1.5 watts per candle. At present the matter is clearly in an experimental stage, for the making of filaments of rare refractory metals represents an unexplored field.